The Metal Worker.

A WEEKLY JOURNAL OF THE TIN, PLUMBING AND HOUSE FURNISHING STOVE TRADES.

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CORNICE MAKING.

VIII.

The machine illustrated in the accompanying engraving is known to the trade as a "clamp" or a "pair of clamps." It consists of two jaws for holding the iron in position, one of which has proper adjustments for fastening a round rod or roll of wood, which acts as the former, the shape being imparted by pressing or drawing the iron by hand over the former. Although the machine, as represented in the engraving is shown in one of its improved forms, it represents the original idea, so far as we know, of a forming machine for cornice work which acts independent of the machine making the bends. One of the first to employ this form of machine in cornice work was, we believe, Mr. Henry M. Sanders, mention of whom was made in the last article in connection with brakes. The jaws of the machine as originally constructed by him were clamped by means of screws operated by cranks, which, according to the direction in which they were turned, either drew the jaws together or separated them. The formers consisted of rods and rolls of wood of different dimensions, in which were pins which fitted into holes in the front jaw of the clamps. The back jaw of the clamp was fixed, the front jaw moving in or out as the screws were operated. A sheet of iron being bent at right angles, from which a form was to be started, was laid upon the back jaw, with the flange between the jaws when they were brought together. The bend was first sharpened up, so to speak, by means of a mallet; the former was then put in place, the jaws remaining closed. The sheet of iron was next forced over the former, very much in the manner as indicated in our engraving.

It is proper to remark in this connection that this machine preceded the brake referred to in the last article. Prior to the use of the brake, it was used for making the square bends, the iron being clamped and forced over by means of the mallet. The fact that a sharper bend was made by this means than could be produced by the brake, was no doubt the reason which led to the sharpening up of the bends in the clamp when the brake came into use before making the forms as above referred to. It may seem a thing of little importance—this matter of sharpening up the bends in a molding—but as between two pieces of work, one having been formed with the bends as they came from the brake, and the other having the bends finished in the clamp before forming, there is enough difference in appearance and accuracy of profile to make this little additional labor justifiable.

The clamp as now used in some of the best shops in this country is a very different affair from the original machine devised by Mr. Sanders. In place of the screws closing the jaws, cams or eccentrics are employed, making a very considerable saving in the time required to operate the machine. In some machines the cams are supplemented by springs which force the jaws apart; in others the cams are so yoked that their movement opens the jaws when moved in one direction, and closes them when moved in the other direction. The latter plan is undoubtedly the most satisfactory, all things considered. The spring is quite objectionable, from the fact that it frequently forces the jaw open in such a way as to jerk the handle of the cam from the hands of the workman, often endangering his personal safety. In place of the primitive manner of fastening the former, consisting of pins attached to the former and holes in the face of the jaw—an arrangement which necessitated lifting the former from the machine every time a sheet of iron was inserted—a device which may be described as a "tool carrier," has been invented and applied, by which means the former is withdrawn from the molding by the simple movement of the handle, throwing it far enough away from the point of contact between the jaws to admit the application of the stay for testing the shape imparted, and the use of the mallet and other small tools in dressing up the shape. This tool-carrier is provided with an attachment by which the former can be set a little further in or out, according to the necessities of the case—a matter of no small advantage in the shaping of various sorts of moldings, and something that was altogether beyond the possibilities of the screw attachment. The formers employed in connection with this tool-carrier are much improved as compared with the originals, whose use they have supplanted. They are fastened to the tool-carrier by means of dove-tail slots, and are almost instantly put in place or removed, a simple tap of the hammer on the end being all that is required to loosen them or fasten them firmly in place. Instead of being simple round rods of wood or iron, as were formerly employed in connection with these machines, the formers now consist of a combination of iron and wood of such form as to admit most readily of their being placed in the exact position in which they are the most useful.

With the improved clamps for forming, and a brake simple in construction and adapted for making bends in the best manner, the style of work turned out and the speed with which it is produced would, if stated, appear somewhat marvelous to those who are accustomed to using what we may term a compound machine, or, in other words, a machine arranged for doing both bending and forming. In this connection, stress is to be laid upon both the amount of work produced and its quality. From experience, we have no hesitation in saying that far better work is produced upon an average by this method of managing than is produced upon special test occasions by the other method. It holds to reason that a machine constructed especially for one operation, is likely to perform its work with greater dispatch and accuracy than if it be constructed for doing two things the nature and requirements of which are dissimilar.

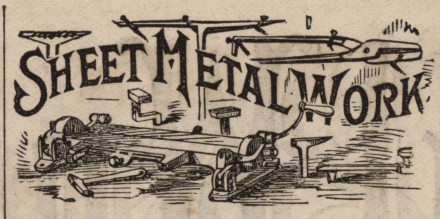
The principle upon which the forming is based, both in the clamps here illustrated and described, and also in all the forming attachments for brakes which are operated by forcing iron around the former, is that of separating the forms, whatever may be their intricacies, into segments of circles. In other words, the formers, for the most part, are round or parts of round shapes over whose surface the iron is forced. Accordingly, it is equivalent to drawing it through an arc struck from an imaginary center corresponding to the center of the former employed. In the use of clamps and of similar forming devices attached to brakes, scarcely more than a quarter circle can be made, on account of the fastenings and the parts of the machine itself being in the way. Accordingly, for certain classes of forming, wherein shapes consisting of more than a quarter circle, whatever may be its diameter, are required, machines operating upon other principles have been devised. One of these—which is in use in one of the largest establishments of the country—consists of a table wide enough for holding the sheets of iron to be formed, the edge of which is provided with a metal plate of about ¼ inch in thickness, which is made to project beyond the edge of the table ½ or ¾ of an inch. A carriage, moving transversely and operated by suitable mechanism terminating in a crank or handle, carries what may be described as goose-necked standards, which are pointed at their tops. Upon these is placed a former, either of wood or iron, which in section is a complete circle. By moving the carriage by means of the handle above described, the side of the former, at a point opposite its center, is brought in close contact with the projecting metal edge of the table. A sheet of iron being clamped between the former and the edge of the table, there is clear way for shaping it around nearly three-quarters of the surface of the former. This device is in use for shaping ridge molding and other work of a similar form in which a projecting bead is required. After the form is made by bending the iron around the former, the piece is sometimes reversed and the neck placed between the former and the projecting edge of the table; the bead is still further closed by being squeezed between the two.

Cornice Making.—An Improved Form of Clamp.

The machine above described takes the place of rods supported by trestles, a device in common use in shops not provided with a better arrangement for forming. Malleting the iron over these formers and shaping it by hand is an uncertain operation, owing to the spring of the rod or bar between its supports. Although these primitive devices have served a good purpose in their day, the machine above described produces much more perfect work and with probably a saving of three-quarters of the labor.

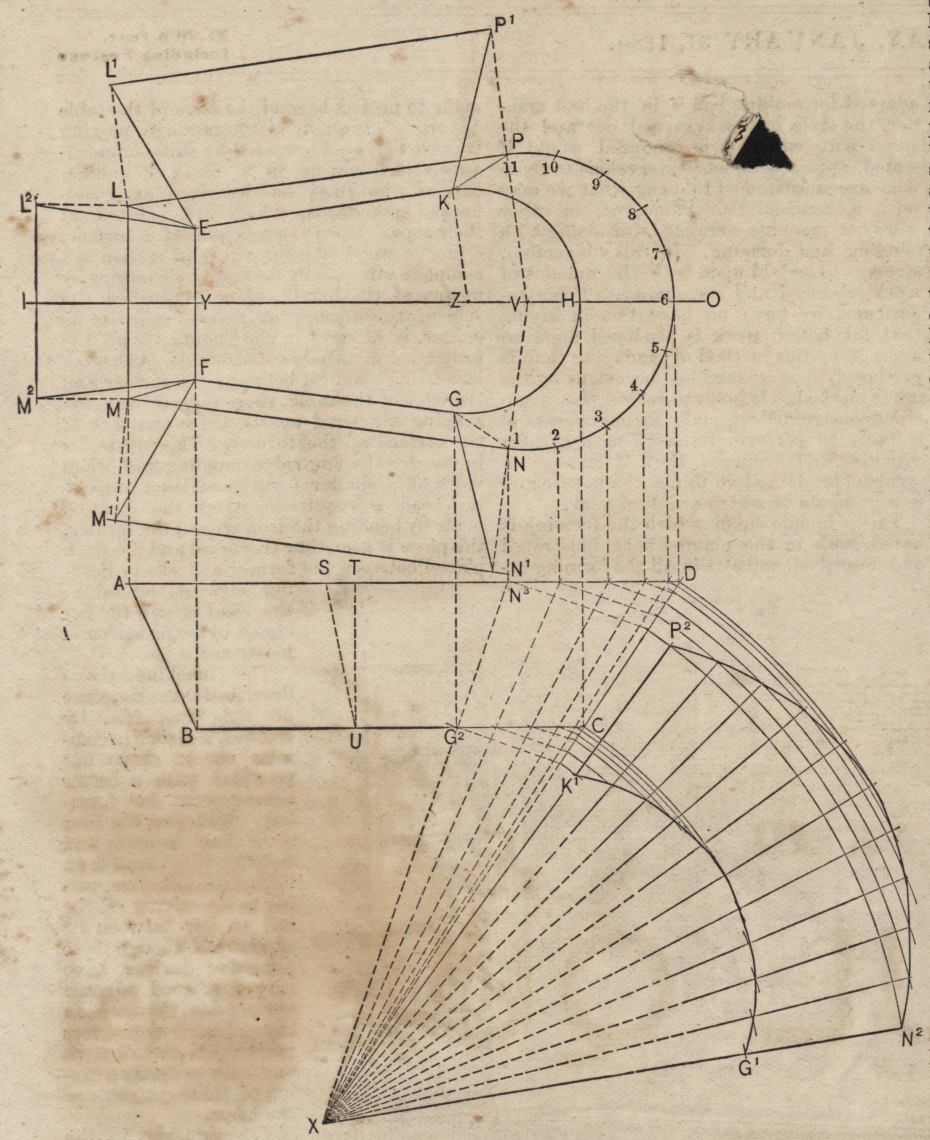
The remarks in the last article concerning brakes operated by power, apply with equal force to forming machines. The estimate that we made of the labor required to bend a pound of iron into a molding of some required profile, applies with even greater force to the forms. The labor usually expended in shaping galvanized iron into the form of moldings is, as compared with the shaping of any other material at the present day, altogether unreasonable. Labor-saving devices in cornice making have not kept pace with labor-saving devices in woodworking and in other co-ordinate industries. Certainly there is nothing about the operation of bending or forming a thin sheet of metal—as, for instance, No. 26 galvanized iron—which should make it impossible to perform the operation by a machine moved by power, and which would require only one man or boy to tend it. It is true, such a machine, whether for bending or forming, must be almost universal working in its capacity. That is, it must be adjustable, if it be a forming machine, to make any sized form and to make forms corresponding to any segment of a circle; it must be adjustable so as to start a form either from the bend or from another form, or directly from the flat sheet of iron. If a bending machine, it must be adjustable to make a bend at any angle, and to make several bends in succession, each at a different angle, for such circumstances sometimes arise. In the devices which have been invented and constructed by cornice makers in the attempt to perfect their machinery, some approaches to the principles upon which power machines are to be constructed

for doing such operations have been made. We remember, several years since, to have seen in the city of Baltimore a forming machine, which, to our mind, possessed the principles that, in the hands of an inventor of ordinary skill and ingenuity, could have been adapted to the use of power. As we recollect it now, the iron was clamped to the former, placed somewhat in the general manner shown in the clamp illustrated in the accompanying engraving. Behind the clamp, and taking the place of the workman's hands, was inserted a wedge-shaped follower, as it might be called, held in place by a frame which revolved around a center corresponding to the axis of the former. Its office was to force the iron against the former, but instead of doing this in isolated spots, as by the hands of the workman, as shown in our engraving, it operated in a uniform sweep from the point of starting to the point of finish. The device, as we saw it, was exceedingly crude, and in all probability, as then constructed, was not suitable to compete with hand labor. It simply impressed us with the idea that certain principles



The Pattern for a Tapering Bath Tub.

Our correspondents D. A. B., of Austin, Tex., and F. E. B., of Los Angelos, Cal., request a diagram of the patterns of a tapering bath tub. The accompanying cut and the following description are of a tub the top and bottom of which are parallel. Since in many instances an article of this kind is required having less depth at the foot than at the head, it is only proper that we should call attention to the method of describing the pattern of such a shape, which necessarily differs somewhat from that shown in the engraving. By inspection it will be seen that the top line in the present instance has



Patterns for a Tapering Bath Tub.

embodied in its construction might be applied to machines of this character, thus adapting them to the use of power. The closing of the clamps, certainly, could be advantageously performed by a power attachment. The movement of the tool is already provided for by the tool carrier above described. To revolve such a frame as we have described, carrying a shaper or follower against the former, would require considerable strength, and, it seems to us, might be moved advantageously by power. We throw out these suggestions as to the way in which the power-forming machine may be constructed for the benefit of such inventors as are interested in this subject. If the cornice business is to maintain its rank among the industries of the country, the facilities employed in manufacture must be greatly improved, and in place of two men being required to go through the number of motions recited in our last article, in order to bend and shape a light piece of iron, one man, or what is better, a boy, using steam-power machines, must be able to do the same work in a much shorter period of time.

Covington, Ky., has consolidated the offices of Superintendent and First Engineer of Water Works in one office. Chief Engineer Rensford has reported 563,872,753 gallons as the quantity of water pumped during the year 1879, and 56,189 bushels as the quantity of coal consumed in the same time.

The Citizens' Gas-Light Co., of Vincennes, Ind., has ordered, for an elevator company at that place, a gas engine of 17-horse-power. This engine is expected in a short time from Europe, and it is said will be the largest gas engine in the United States.

been used as the base from which to work in describing the cone, of which the curved end piece is a section. In the event of the top of the tub being upon a slant, we would use the bottom line as the base, and continue the measuring lines up until they intersected the top, from which point the pattern would be developed in the same manner as here shown. The example, as we have given it, illustrates all the principles involved in either form of tub, and any one who gives it a little study will readily understand how to apply them in cutting shapes slightly different. With this much of explanation we will proceed to the demonstration.

Let L P O N M be the plan of the article at the top, and E K H G F the plan of it at the bottom, and let A D C B be the side elevation. Inasmuch as the article is tapering in plan, the conical part of the pattern will include a little more than shown by a semicircle in plan. The lines showing the junction between the straight sides and the conical part are to be drawn perpendicular to the sides of the article. Therefore lay off in the plan V P and V N, drawn from the center V of the curved part of plan of the top of the article, perpendicular to the sides L P and M N respectively. And in like manner from Z, the center by which the curved part of the bottom of the article is struck, draw Z G and Z K. Draw $L^1 P^1$ and $M^1 N^1$ parallel to the sides L P and M N and equal in length to them, as determined by the T square placed at right angles to them and brought against their ends, and in space from them equal to the flaring hight of the side, as shown by S U of the elevation. Connect L^1 E P^1 K, M^1 F and N^1 G, as shown, which will complete the patterns of the sides. For the pattern of the square end, make Y I equal the slant hight of the end, as shown by A B of the elevation. Through I draw $M^2 L^2$, in length equal to M L, determined by the T square, as before described in connection with the sides. Connect L^2 E and M^2 F.

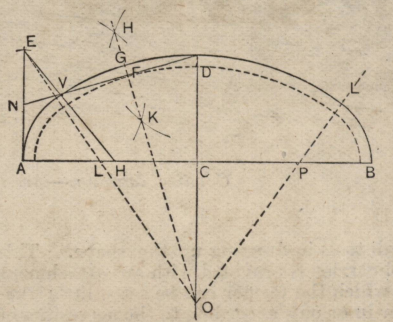
The rounded end of the article is the section of an oblique cone, of which we must first complete the elevation by producing the side D C of the article in the direction of X indefinitely. From the points G and N in the plan of the bottom and top of the article, respectively, drop points on to corresponding lines in the elevation, all as shown by G^2 N^3, through which draw a line, which produce until it meets D C extended in the point X. Then X is the apex of the cone, of which G^2 N^3 D C of the elevation is a frustrum. Divide the plan N O P of the cone into any convenient number of equal parts, and from them let fall perpendiculars to the base N^3 D, from which carry lines at right angles to the axis X N^3, producing them until they cut the side X D, as shown. From X as center strike arcs corresponding to the points thus obtained in X D. From the points in N^3 D carry lines toward the apex X, cutting G^2 C, as shown, and from these points likewise carry lines perpendicular to X N^3 to X D, and from X as center strike a similar set of arcs. From X draw any straight line, as X P^2, producing it until it meets the first arc of the set representing the top of the article, as shown in the point P^2. From P^2 as a starting point, with the dividers set to the same space as used in subdividing the plan, step to the second arc, and from thence to the third, and so on to the number of spaces in the plan, and terminating in the point N^2. A line traced through these points, as shown by P^2 N^2, will be one side of the end piece. From these same points draw lines in the direction of X, crossing the second set of arcs. A line traced through the several points of intersection thus formed will be the other side of the pattern.

Drawing Semi-Ellipses.

From H. D. C., *Philadelphia.*—I inclose two rules for drawing semi-ellipses which I think will be of interest to readers of *The Metal Worker*. It will be evident that rules by which the half figure can be drawn may also be used in drawing the complete figure. So these rules may be employed in all cases in which the ellipse is required to be drawn. By the dotted lines I show how parallel elliptical lines may be drawn.

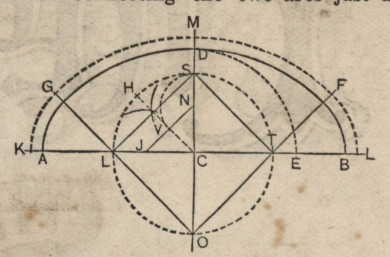
In Fig. 1, A B is the given long diameter, and C D one-half of the short diameter, or it may be called the rise of the arch or frame, if the shape is being described for such a purpose. Draw C D at right angles to A B, squaring up from its center point C. Draw A E equal to C D, and likewise at right angles to A B. Ascertain the center point in A E, as N, and from it draw a straight line to D, as N D. Determine the middle point of A C, as H, and draw the straight line H E, cutting N D, previously drawn in the point V. Determine the middle point in V D, as F, through which draw a straight line at right angles to V D, prolonging it indefinitely in the direction of O. Produce D C also in the same general direction until it meets the last line drawn in the point O. Draw the straight line O E, cutting the long diameter in the point L; then L is the center and L A the radius of the arc representing that part of the ellipse indicated by A V. Upon the opposite end set off B P equal to L A, and strike the arc B L. From O as center, with radius O N, describe the arc V L, thus completing the half ellipse. A parallel line, either within or without this line, may be struck by using the same centers, but diminishing or increasing the two radii as the case may be.

In Fig. 2 let A B represent the long diameter of the figure. Divide it in the center, and from the point C thus obtained square up, making C D equal to half the



Semi-Ellipses.—Fig. 1.—*Rule for Constructing the Figure from Three Centers.—Contributed by H. D. C.*

short diameter, or the rise. From the point C, on C B, set off C E, in length equal to C D. From C, on C D, set off C N, equal to E B, and on C A set off C J, also equal to E B. Draw J N, which bisect, obtaining the point V. From N set off N S, equal to V N, and from J set off J L, also equal to V N. Produce D C indefinitely in the direction of O. With C L for a radius, and from C as center, describe the circle, as indicated by the dotted line, thus establishing the points S E and O. Then O, L and T are the centers from which the arcs composing the figure are to be struck. From O, through the points L and T, draw lines, which produce indefinitely in the direction of G and F. Then from L and I as center, with radius L A and T B respectively, strike arcs from A and B, to meet the lines drawn through their centers from O, all as shown. From O as center, with radius O D, strike the arc connecting the two arcs just described, thus completing the half ellipse. As in the case of Fig. 1, a parallel curve may be drawn, either within or without, by using the same centers, varying the radii to suit.



Semi-Ellipses.—Fig. 2.—*Another Rule for Constructing the Figure from Three Centers.—Contributed by H. D. C.*

Softening Hard Water.

So much of the best water obtained in large districts of England is rendered hard by the presence of an excess of bicarbonate of lime, that an account of the processes by which this hardness can be reduced, and the chalk or limestone waters rendered more available for washing and for some purposes of cooking, will not, says the *Journal of Gas Lighting*, be out of place at the present time. Dr. Clark, of Aberdeen, long ago suggested that the addition of a certain quantity of quicklime, which should combine with the carbonic acid holding the lime in solution in the water, and cause the precipitation of an insoluble powder of carbonate of lime, including much of that which had been held in the water, could be carried on economically, and would be valuable in some cases. He considered that the fine powder would be available for certain purposes in the arts, at least to some extent, and that in this way the cost would be diminished. Dr. Clark pointed out that every pound weight (16 ounces) of chalk consists of 8.64 ounces of lime and 7.36 ounces of carbonic acid, and that the 8.64 ounces of lime (which could be separated by burning the chalk in a kiln) would be soluble in 40 gallons of water. This pound weight of chalk, however, would require 5000 gallons of water for its solution. He explained also that by combining a pound of chalk (which, as we have seen, already contains 7 ounces of carbonic acid) with another 7 ounces of carbonic acid, the resulting substance (which is now a bicarbonate of lime) would be soluble in 400 gallons of pure water, the result being a water of the same average hardness as ordinary well water obtained from the chalk strata. If, then, 40 gallons of clear saturated lime water, containing 9 ounces of lime is mixed with 400 gallons of clear chalk spring water also containing 9 ounces of lime, the ingredients combine, forming 2 pounds of chalk in a light, impalpable mud, and leaving clear water above, containing about 1½ grains of carbonate of lime per gallon.

An improvement on this process, which has been adopted on a moderate scale in various places in the manner above described, was some years ago suggested by Mr. Porter, and his modification, called "The Porter-Clark process," was adopted at the new Middlesex County Asylum, on Banstead Downs. There, in the early part of 1878, about 6000 gallons of water per hour were purified, throwing down and separating the impalpable powder as mud with increased rapidity and efficacy, by forcing the water to pass through disks of cloth after being treated with the lime. The operation was, however, both slow and costly.

Dr. Clark's process has been adopted at Caterham, Canterbury, Tring, Aylesbury, Redhill, Colne Valley, Swindon, and by the Kent Water Company. In some cases it has been retained, but we do not hear of many recent applications. The rapid accumulation of the precipitate, and the difficulty of so far drying this mud as to render it easy of transport, may be judged of when we remember that for every million gallons per day of chalk water softened, a mass of wet mud, weighing more than two tons when dry, would have to be handled. Thus, to apply the method to the quantity of water now used in the metropolis, assuming it to be all lifted from chalk wells, we should have to reduce to dryness and afterward deal with nearly 90,000 tons of impalpable powder of chalk per annum. This, however, is not the sole, nor perhaps the most serious, objection to the process. The water thus softened has been found to deposit rapidly, in the pipes that convey it to its destination, a mass of minute crystals of carbonate of lime, choking them up and being very troublesome to remove.

Wherever limestone water prevails, the same objection as to hardness is found to apply to the water that has long remained in contact with the rock. No doubt hardness is uneconomical with regard to the use of soap, but it is more than doubtful whether for drinking purposes it is in any way objectionable. It certainly makes better beer and

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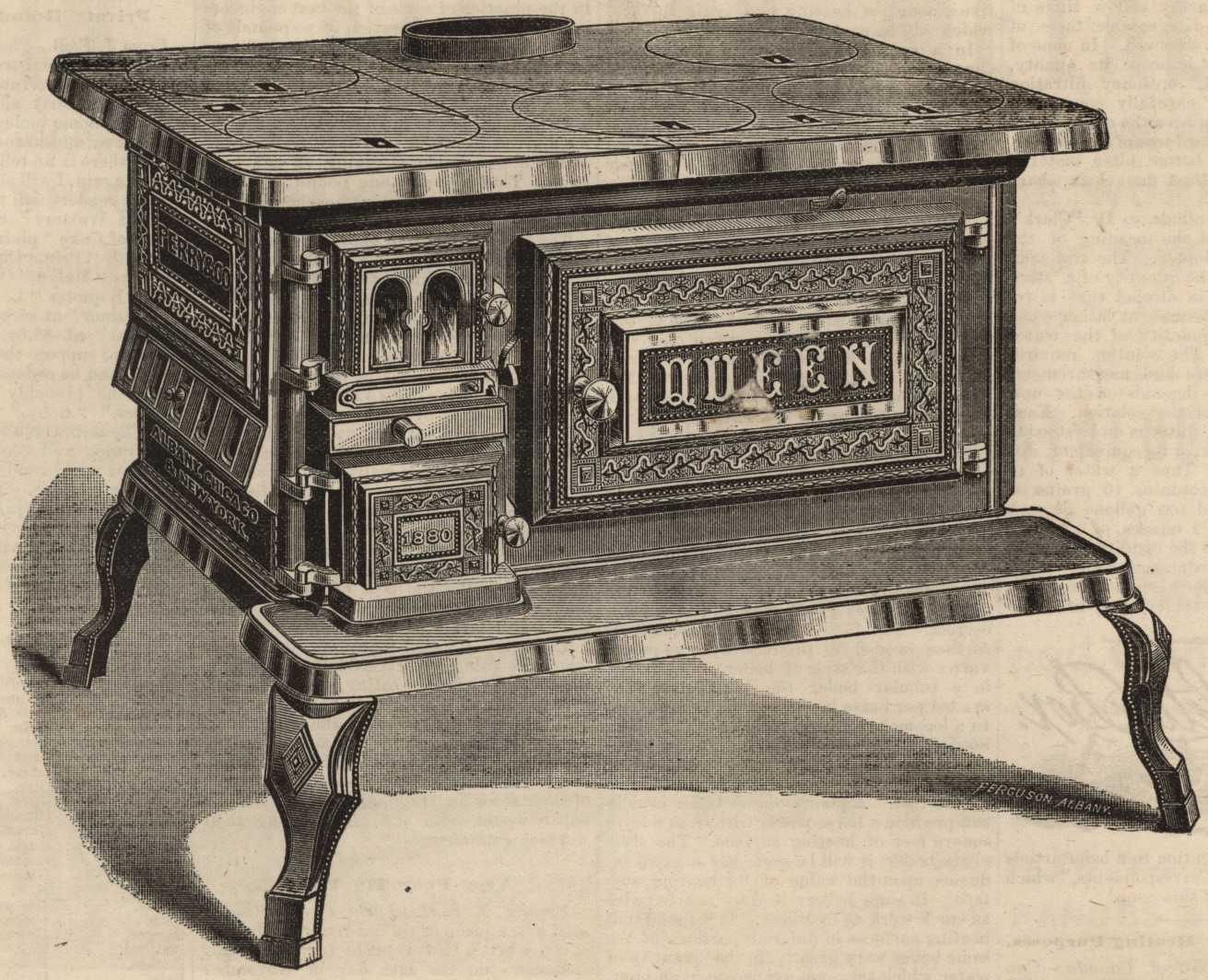

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other fermented liquors than soft water; it is far more pleasant for drinking, and probably more wholesome. Even for infusions such as tea it is hardly inferior, as, while boiling hard water extracts the aroma and the better flavor, it leaves behind the tannin and the coloring matter, which are not desirable or pleasant, and which give the deeper color to tea made of soft water.

The process of softening does not in any way assist in the filtration of water, nor does it remove the earthy yellow tinge of flood waters, or the disagreeable taste of vegetation sometimes observed. In none of these respects does it improve its quality. On the other hand, ordinary filtration through sand, when carefully conducted, does unmistakably improve the quality, and even diminishes the hardness of hard water. On a large scale, no better filter material has been discovered than fine clean, sharp sand.

It may be well to allude to Dr. Clark's test of hardness and the meaning of the degrees generally adopted. The test consists in ascertaining the quantity of a standard solution of soap in alcohol that is required to produce a permanent lather when mixed with a given quantity of the water under examination. The solution requires to be made with care and measurement, and the whole value depends on the uniformity of strength of the solution. Each degree of hardness in water is understood to mean a grain of chalk, or its equivalent, dissolved in the water. Thus a water of 16 degrees of hardness contains 16 grains of chalk per gallon, and 100 gallons of such water would require 2 ounces, or 2 pounds of soap to reduce it to the condition of distilled water. The hardness of water is inferred from the number of measures of soap solution employed, a table being used for reference.

The editor calls attention to a brief article entitled "Impatient Correspondents," which appears on page 10 of this issue.

Size of Boilers for Heating Purposes.

From J. W. H., *Montreal, Canada.*—Can you furnish me through your columns with a rule for calculating the size of steam boilers, either the ordinary tubular or locomotive pattern, needed to heat a given quantity of 1-inch pipe heating coils? How can I calculate the size of boiler and grate surface necessary to heat 1000 feet of 1-inch pipe, or for any number of thousands as may be required. I know this is a question involving others, but I would like to see some discussion upon the matter.

Note.—This letter we at once sent to our friend Mr. Alexander Nimmo, of Brooklyn, whose great experience in heating with hot water renders his opinion in such matters very desirable, and from him we have received the following letter, in which he discusses the questions proposed, as well as some others intimately connected with them:

DEAR SIR.—In reply to the letter of J. W. H., in which he asks for information in regard to the rule for calculating the size of boiler and grate surface necessary for heating a certain amount of 1-inch pipe, I send you the following, which I hope may be of some service to him and others:

One cubic foot of water converted into steam of 2½ pounds pressure above atmospheric pressure (17½ pounds actual pressure) per hour will heat about 730 feet of 1-inch pipe, or 540 feet of 1-inch pipe with the same amount of water converted into steam of 30 pounds pressure above the pressure of the atmosphere.

There is likely to be very little difference of opinion on the above rule, but when we come to give any rule for the grate and boiler surface, it is likely to call forth as much discussion as did the tin roofing and wash boiler questions. If it does there will be no reader of *The Metal Worker* more pleased than I to have the experience of others upon the subject.

The common rule for determining the size of a boiler is to estimate that one capable of converting 1 cubic foot of water into steam in an hour will be sufficient to furnish a 1 horse-power engine with steam. Such a boiler will be rated at 1 horse-power. Such a boiler will heat 730 feet of 1-inch pipe to the temperature named above.

But what is the most economical size of grate and heating surface of boiler to convert 1 cubic foot of water into steam? Here is where the diversity of opinions commences. Take the practice of boilers makers, engineers and theorists, and we shall find the grate surface ranges from 144 square inches to 70 square inches. The same difference is seen in the boiler surface, which varies from 16 feet down to 6. There is surely difference enough in these figures to warrent a full discussion of the matter through the columns of *The Metal Worker*. I recommend that a boiler evaporating 1 cubic foot of water per hour have a grate of 1 square foot area, and not less than 14 feet of boiler surface. The larger the boiler the less surface it requires in proportion.

ALEXANDER NIMMO.

We take it for granted that Mr. Nimmo's statement in regard to the amount of surface which can be heated under the conditions named and in this climate are correct. We can, we think, give some light upon the subject of sizes of boilers, and relative amount of heating and grate surface, which will be useful.

In a good steam engine of the present time a horse-power may be easily obtained by the evaporation of 30 pounds of water in one hour. Experiments made by Mr. Chas. E. Emery, C. E., as long ago as 1866-1868, show that a horse-power could be obtained with from 25 to 30 pounds of water per hour, and this, too, in regular practice. The judges at the Centennial Exposition adopted 30 pounds of water, evaporated from a temperature of 212 degrees, as the standard of a boiler's horse-power, and this may, therefore, be taken as the standard in making computations. It may be said that the best engineers and boiler-makers accept this standard of measurement as a fair one. As a cubic foot of fresh water weighs 62 and a fraction pounds, it will be seen that Mr. Nimmo's horse-power is twice as large, in round numbers, as the figures which we have named.

The next point to be considered is how many feet of heating surface are needed to produce one horse-power, or evaporate 30 pounds of water in an hour. Mr. Nimmo, in his statement regarding the very wide variation in the proportions stated by various engineers and boiler makers, is correct. There are the widest variations, and yet the different figures given may be in the main correct. The fact is that the amount of surface needed to produce a horse-power varies with the style of boiler used. Thus, in a tubular boiler the heating surface needed per horse power is from 14 to 18 feet. In a locomotive boiler, from 12 to 16 feet are needed for the same purpose. In the vertical tubular boiler a still greater amount of surface is needed; it ranges from 15 to 20 square feet. A plain cylinder boiler usually can produce a horse-power with from 6 to 10 square feet of heating surface. The style of the boiler, it will be seen, has a great influence upon the value of its heating surface. In some boilers it does nearly twice as much work as in others. It is found that heating surfaces in different portions of the same boiler vary greatly in the quantity of water which they can evaporate in an hour. For example, in the furnace of a boiler where the gases strike the plates at a temperature of 1200° F., and the temperature of the boiler is perhaps 324 degrees, as it would be with very high pressure steam, every square foot of heating surface might be expected to evaporate 11 pounds of water per hour. But at the further end of the flues, just where the cooled gases were entering the chimney, it would not be likely to evaporate more than half a pound in an hour.

The smaller the boiler the more feet of heating surface are needed for the production of a horse-power; but this increase is not as rapid as might be expected.

In common stationary boilers the grate area in good practice is about 1-20th part of the heating surface. In return flue boilers, it is about 1-25th part. In vertical tubular boilers the grate surface is sometimes as small as 1 square foot to 30 feet of heating surface. In other words, the best proportions vary according to the style of boiler used. In the same way we find the amount of coal which is used on each square foot of grate surface in an hour, varies according to the different kinds of boilers. What would be a very small allowance for one would be altogether too large for another. Thus we find that with a forced draft with a return flue boiler, as much as 40 pounds of coal may be burned each hour on a square foot of grate. With a natural draft, in ordinary boilers found in manufacturing establishments, from 10 to 15 pounds of coal are used on each square foot of grate per hour. On some styles of boiler the best results may be obtained with about five pounds.

In regard to the amount of pipe which can be kept hot by 1 horse-power, we may say that allowance should always be made for the temperature of the external air. Manifestly the amount of heat which would make a room comfortable with the external air at 25 degrees, will not be sufficient to heat the room when the external temperature drops to zero.

In speaking of heat and making calculations in regard to it some measure must be employed. In all English-speaking countries this measure is called the "heat unit," and is the quantity of heat required to raise the temperature of one pound of water one degree. Each horse-power of boiler will give nearly 29,000 heat units per hour. That is, it will heat 29,000 pounds of water one degree, or evaporate 30 pounds of water to steam.

Messrs. Babcock & Wilcox in their practice adopt the following figures, which may be of use. In brick dwellings in blocks, one horse-power will heat 20,000 cubic feet. In brick dwellings exposed on all sides the same boiler power will heat about 15,000 cubic feet. In exposed wooden dwellings a horse-power will heat about 10,000 cubic feet. Brick stores in blocks require about one horse-power for each 15,000 cubic feet of space to be heated. In buildings largely of glass the proportion of cubic contents to each horse-power of boiler falls to 8000 feet or even less. It is calculated that horizontal and inclined pipes will transmit 330 heat units per hour for each degree of difference between the temperatures of the two sides. In the practice of some of the best engineers in this city, the evaporation of 30 pounds of water per hour is calculated to be sufficient to supply 300 feet of 1-inch pipe. This figure is almost precisely the same as that given by Mr. Nimmo.

In calculating the amount of heat needed for a given operation, we take each pound of steam as capable of giving off 966 heat units. That is to say, one pound of steam at the pressure of the atmosphere would heat 966 pounds of water one degree.

The loss of heat from glass is a very serious matter. In windows of the ordinary size found in dwellings, the loss of heat for each square foot of surface will be half a heat unit per hour for each degree of difference in temperature between air in the room and that outside. With double windows, when the two plates of glass are not more than an inch or two apart, the amount of loss will be, as nearly as possible, half of what we have stated. Many very elaborate calculations have been made upon the loss of heat through brick walls, and the amount of heat that must be provided by the heating apparatus in order to make it good. While this may be calculated with reasonable accuracy, there are many other elements which come in and so seriously disturb the calculations as to make the best of them bearing upon this particular point but little better than materials for a good guess.

There are a great many of our readers who have valuable practical knowledge upon the subject of steam heating, and who could, if they were so disposed, furnish very valuable information concerning the best proportions and arrangement for steam heating apparatus. Unfortunately this information, in a great many instances, constitutes a part of their stock in trade, and to put it upon paper would seem like giving away their working capital.

Very Poor Tin Plate.

From F. M. S., *Litchfield, Ct.*—Inclosed I send you a piece of tin cut from the bottom of a tea-kettle that I made for one of my customers on the 24th day of November last. I bought it for best quality of tin plate. From the way it has rusted out, can you blame the customer for swearing some? A tea-kettle that completely plays out in 42 days is certainly a poor article. The water used was cistern water. I would like to know the cause of the failure.

Answer.—The piece of tin inclosed in our correspondent's letter, some 2 by 3 inches in size, contains a number of rust holes as large, or larger, than the head of a pin, which go clear through the plate, and others which go through the iron from the inside and which are closed on the outside by the coating of tin. The tin is nearly all removed from the inside of the piece. The outside, in point of coating, has the appearance in some respects of being a tolerably fair article. The rust upon the inside occurs in spots, irregular in their distribution. It has never been our lot to meet a case of exactly this kind. There is no doubt that the tin used was not first-class, but just wherein the poor quality exists is not so easily determined. The coating, from what we can see of it on the outside of the piece, seems to be of about average thickness; but of that, from the size of the piece, and from the fact that it has been considerably handled, if not cleaned or polished, during the time it was in use, we cannot be very certain. From the fact that the rust occurs in spots, as above mentioned, the idea might be suggested that the iron plate was not sufficiently cleaned before coating; that there were spots of scale upon it, over which the tin did not readily flow, and that the rusting was due to this cause alone. The tin is in a state of destruction too far advanced to determine this point with accuracy. At first glance, we thought the kind of water which had been used in the vessel had something to do with it; but from the statement in our correspondent's letter, it would seem that this cannot be the cause. We have a curiosity, however, to know how other tinware stands the same usage. There may be something about the water which our correspondent has not discovered. Very possibly the difficulty with the tin is from a combination of all the causes we have suggested—that it is a very poor article of tin plate in the first place, both in coating and in cleaning of the sheet preparatory to dipping, and that the water which has been used in it is of a character calculated to destroy tinware of whatever quality.

Exchanging Views.

From W. A. B., *Port Austin, Mich.*—I am a new subscriber to *The Metal Worker*, and am very sorry I did not subscribe long ago. It is one of the finest mediums for our trade to exchange views and learn of each other. I have worked at the business just 30 years, but I see a good deal to learn yet by reading *The Metal Worker*. I shall be pleased to write my experience of apprenticeship and tell the boys how we used to do it.

Note.—We are always glad to receive letters narrating practical experience. We hope our correspondent will not delay long in sending us the remembrances of his apprenticeship.

Private Brands of Tin Plate.

From J. E. B., *Cincinnati, Ohio.*—For the benefit of my colaborers I herewith present you a list of private brands of tin plates, embracing nearly all of those now in this market. Some included in this list have not made their appearance here for a long time, but as there is no telling how soon they may appear again, I will give you the list complete.

Your readers will find them to be either "Select Wasters" of charcoal, or "First Grade of Coke" plates, and sold in competition with "Prime Charcoal." For instance, A quotes "Melyn," "E. C. C." or "Talbot" at $9; B quotes "L. P. L.," "P. S. & Co." or "Radnor" at $8.95, and C. quotes "Best Charcoal" at $8.87. It is natural for the tinman to suppose that C.'s prices are the lowest, and he orders; but when the plates arrive he probably finds the plates are "Wales," "Roby," "Vole" or "Albert," &c. The latter is in reality an "A. Z." coke (1st grade), and could probably be bought under its own brand ("A. Z.") from 75 cents to $1 per box less. This will show my colaborers how this private-brand business is worked, and they will be money in pocket if they will watch the matter more closely. If I have made any "errors" in the following list I hope some of the "leading importing houses" will correct me in your next issue.

LIST OF PRIVATE BRANDS.

Arundle.	Flag.	Nynanza.
Albert.	Fendy.	Perfect.
Apollo.	Flannon.	Pine.
Arden.	F. D. & F.	Prior.
Alfred.	Gefu.	Park.
Arran.	Glangan.	Peril.
Amis.	Grant.	Penrhos.
Aal.	Globe.	Paxion.
Alma.	Glyn.	P. J. & Co.
Banks.	Garst.	Pallas.
Bale.	Glamis.	Peabody.
B. L.	Garnllyd.	Penlos.
Bryn.	Garn.	Penarth.
Beaufort.	Grattan.	Roslin.
Broal.	Glamorgan.	Russ.
Bacon.	H. F.	Regent.
Byron.	Hoford.	Resolven.
Bath.	Hudson.	Ridle.
Bangor.	Howard.	Roby.
Bedford.	Halborn.	Ruby.
Burnes.	Huber.	Star-Inur.
Bala.	Humber.	Syn.
Brecon.	Huron.	Snowden.
B. M. P.	Irvon,	Southwell.
Berrpt.	Independence.	Sandon.
Bardsey.	Idnis.	Standley.
Bell.	J. J. N.	Sedan.
Cedar Bell.	J. S. C.	Strad.
Comet.	K. B. C.	S. P.
Cliff.	Keystone.	Saxton.
Carver.	K. G.	Sydney.
Cedar.	Ladnor.	Sefton.
Caselton.	Lanta.	Stanley.
Conway.	Lake.	Stradbrooke.
Celtic.	Llanfair.	Sizar.
Castle.	L. R. B.	Seven Oaks.
Cara.	L. D.	Severn.
Cumford.	Llanover.	Stradey.
Cumburle.	Lulia.	Tower.
Cairo.	Llandrillo.	Tanna.
Carn.	Loupel.	Torry.
Cumber.	Llewellyn.	Tenby.
Crosbey.	Llannon.	Trevor.
Cfn.	Lurla,	Teffy.
Cecil.	Metor.	Tutbury.
Carlton.	Merion.	U. S. K.
Corry.	M. M. A.	Vole.
Duffuld.	Machgan.	Vulga.
Dinas.	Monnow.	Victor.
Dublin.	M. J. C.	Vernon.
Dolwen.	Maltese.	Victoria.
Derby.	Monmouth.	Westminster.
D. V. D. & Co.	Madison.	Weston.
Duffield.	Milton.	Wern.
E. A. P.	Millwood.	Webster.
Excellent.	Melton.	Wales.
Elgin.	Machynis.	Wever.
Ely.	N. J. C.	Wampole.
Eagle.	N. R.	Wolton.
Emly.	Norfolk.	Zenby.
Eureka.	Newport.	Zara.

Note.—The above list is more comprehensive than any other we have published. The list furnished by "Fox," and published in *The Metal Worker* of June 28, 1879, was the most complete of all sent to us up to the receipt of this one. By comparison, we find that the above list includes nearly all the brands enumerated by "Fox" and about as many more. Our readers will, no doubt, find it very interesting reading. A comparison of their invoices of plates with it may show some things which will surprise them.

In one of the issues of *The Metal Worker* of last fall we suggested the idea of every reader of the paper sending us a list of the brands he was using, together with his opinion of the quality of each, the data thus furnished to be used in making up a directory of brands. So far as our memory serves us now, we believe this is the first letter received on the subject of brands since that date. We suppose each one has been waiting for the others to act. What is everybody's business is nobody's business—so nothing has been done. We merely refer to the matter now to remind our readers that, by co-operative effort, they are able to provide themselves with very desirable trade information. We are still ready to receive the letters sent in by way of response to that invitation, and at the proper time to present the results in classified form for the benefit of all concerned. We leave it with our readers to do as they see fit.

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ALL SIZES AND QUALITIES OF CHARCOAL AND COKE TIN PLATE. EXTRA QUALITY STAMPING PLATE. ROOFING PLATES, ALL GRADES

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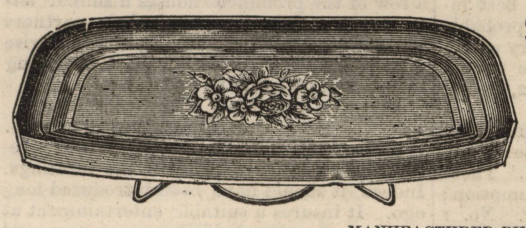
Pig Tin, Antimony, Lead, Spelter, Sheet Zinc, Ingot Copper, Sheet Copper, Sheet Brass, Wire,

RUSSIA SHEET IRON, COMMON, CHARCOAL AND POLISHED IRON.

Solder of Superior quality. Taggers Tin and Iron.



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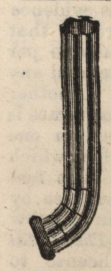

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Champion Stove Cement, composed of fireproof ingredients, ready for use, is the best ever manufactured for cementing seams and joints in stoves and mounting the same. Price, 4 cents per pound, in kegs and barrels. Special rates by quantity. 15-lb. can sent for $1.

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New Coal Cook Stoves,

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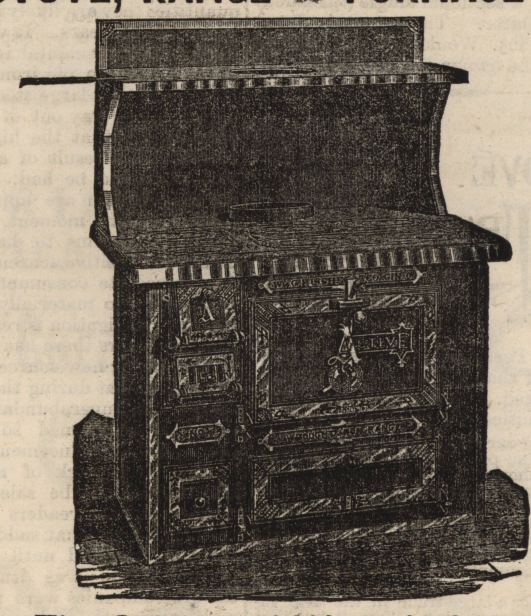

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ALBERT BROWN,

85 Ferry Street, Troy, New York.

Covers for Five-Cent Counter Tin Ware.

From W. H. Y., *Louisa C. H.*—Can you inform me who manufactures the stamped tops to fit outside buckets and coffee pots, like those of lard buckets, used on most of the tinware made up for the five and ten-cent-counter trade?

Answer.—Mr. William Vogel, of 55 Ann street, makes goods which answer the description given by our correspondent.

Driven Wells Patents.

From W. A. H., *Juneau, Wis.*—Can you inform me whether driven wells are patented, and, if so, can you tell me who the patentee is, and give me his address?

Answer.—Driven wells are patented, and the patent has been sustained in the United States courts. Col. Green was the patentee, but the patents are now owned and controlled by Messrs. W. D. Andrews & Bros., 414-416 Water street, New York city. Most of the territory is still in the hands of the owners of the patents. A small portion of it, however, has been sold to various parties. In case there are persons attempting to collect royalties, it is always best to address the owners to see whether agents are authorized.

Was it Fact or "Taffy?"

From J. F. T., *Summit City, Pa.*—I am a constant reader of *The Metal Worker*, and derive many useful hints pertaining to my business from it. Occasionally I have met with such a one in the shape of an account of a big day's work. You are always ready to impart any useful knowledge to us "chips;" accordingly, would it not be well enough to inform H. S. & Co., of Chicago, and for that matter "Tim" also, of a certain book (not exactly a pattern book) which gives us a description, not of wash boilers made in 10 hours, but of a big lake with a rather suffocating and disagreeable smell, in which it seems to me they are in a fair way to take a bath unless they repent and acknowledge that they were giving us "taffy" in their remarkable statement recently published. I am not disposed to discredit the whole statement. They say: "We did not see him do it." This much I am willing to accept as a fact, but the other portions of their statement are as hard to swallow as a saw mill.

WANTS AND ADDRESSES.

Charles S. Scott, of White Rock, Kan., would like to obtain the address of S. Eddy, the patentee of a sectional single (threaded) stove-pipe ventilator. The patent is dated November 14, 1865. Would also like to have the address of the owner of the patent.

A friend in Peekskill sends us a copy of the *Democrat* of that place, with the following article marked. As it is evidently meant to attract our notice, we will notice it:

The foundries of our village have all closed for the season, with the prospect that the cessation will be but for a short time. The stocks of manufactured articles are light, and, with the looked-for increase in the price of all raw materials, dealers will endeavor to discount the advance as much as possible by sending in orders for the spring trade much earlier than usual. To supply these demands, resumption of activities must soon take place.

The prospects for a large trade in the near future are bright and promising. Were it not that the holders of pig iron are endeavoring to force the price of that commodity up to an unreasonable degree, there would be nothing to hinder a steady assurance for the future. Were the price really based on the shortness of supply, the case would be different, but it is simply the work of a clique of Eastern capitalists who are holding large blocks, purchased at low prices, in order to reap an enormous profit should their schemes succeed. We have it on the best authority that nearly ten thousand tons of a well-known brand are piled up at or near tide-water subject to the order of this iron syndicate. Our advice to users of iron is to make as little inquiry about prices as possible and to buy only for actual requirements. Large quantities of English and Scotch pig irons have been shipped to New York and other American ports, and are now in bond awaiting purchasers, provided the asking price is realized. Papers in the pay of the syndicate are advising the holders of these foreign pig irons not to sell at present rates. But as the latter are mostly brokers of small means, it is not probable they can hold out much longer. Should the price of these foreign irons decrease, it will have a corresponding effect on American irons, but only in a limited degree, as but a certain proportion of these can be used with the native irons. High prices, if based on the law of supply and demand, are right and proper, but when predicated on an artificial basis are baneful in the highest degree. We trust the machinations of these speculators may come to grief. We have sounded the warning, therefore take heed.

Having heard much the same views expressed at Albany, Troy and elsewhere by founders who were short of iron, we presume that there are enough in the trade who feel this way to make a brief discussion of the matter interesting.

In the first place the furnace owners ar not to blame for the very rapid and sustained advance in pig iron, which, by the way, has been a very good thing for the stove trade, as it put a stop to a ruinous competition among manufacturers, and compelled an advance in prices to an average at which those who had the judgment to buy iron when it was cheap can make a little money. The iron makers have, so far as possible, protected their customers to their own disadvantage by contracting for large future deliveries at prices far below present quotations, and at a time when it required no foresight to predict a further sustained advance. Among the iron dealers there are some who had the enterprise and courage to do just what any responsible founder could have done at the time—place large contracts with a view to profiting by the advance. We presume it is these dealers who are meant by the reference to the "clique of Eastern capitalists who are holding large blocks," &c. No doubt the writer whom we quote above imagines that these speculators have large amounts of pig iron stacked up in their back yards or hidden away in their closets, which they are withholding from the consumer with a view to producing a pig-iron famine. There is some Scotch pig iron in yard in New York and Boston, simply because the importations have at times so far exceeded the requirements of consumption as to leave a surplus in importers' hands; but the amount thus held is not so large as to cause the holders any uneasiness; they are firm in their views and not at all disposed to sacrifice their iron. If there is any considerable amount of American pig iron foundry or mill, held in "large blocks" by a clique of Eastern capitalists, they have been very successful in concealing its whereabouts. The greater part of that contracted for in a speculative way has already gone into consumption, or the buyers have sold their contracts to consumers.

The rapid advance in pig iron has been brought about not by the demands of makers, but by the eagerness of consumers. That pig iron is scarce there can be no doubt. The limited amount of Scotch and North of England pig iron held in the principal seaboard markets would not relieve this scarcity if thrown upon the market, for the reason that they cannot be substituted for American pig iron except to a limited extent. Those who are holding it are only following the dictates of a sound business judgment. If thrown upon the market at forced sale, it would be promptly bought up by speculators, and again held for a rise. Comparatively few consumers would be willing to purchase any large amounts, for the reason that the interest account would amount to more than such advance as is probable on the quantities they are likely to need for the next two or three years. It would not pay them to lock up their capital in this way. As regards American pig iron, we can say with confidence that large stocks are not held in a speculative way out of the reach of consumers, and that the high prices now current are the result of a demand for more iron than is to be had. The requirements of consumption are apparently unlimited, while, for the moment, the maximum of production seems to have been reached. There is a positive scarcity of ores available for immediate consumption, and it will not be possible to materially increase the supply until navigation is resumed. During the past few years there has been but little done in developing new sources of ore supply, for the reason that during the "hard times" the supply was superabundant, and the hoped-for revival seemed so far distant that there was no inducement to invest capital in the dead work of mines whose product might not be saleable for years to come. As our readers all know, the revival was somewhat sudden, and as it was not fully realized until just as the season of navigation was drawing to a close, the ore companies were not in a position to make contracts for largely increased deliveries before spring. At the present time there is a demand for every pound of desirable ore which can be laid down in the markets from which the furnaces draw their supplies. More furnaces are now in blast than at any time since 1872, and still more would be blown in if they could depend upon adequate supplies of ore and fuel, especially coke. It is rather too expensive to put a furnace in blast to make any one want to do it unless he can see his way clear to a run of several months, at least.

There is nothing in the present condition of the iron market at which consumers have any right to get mad. The advance is the result of natural causes, and prices cannot decline until the supply shall more nearly equal the demand than now. So long as consumers want more iron than is made, so long will they aid in advancing prices; where more iron is made than is wanted, the competition among makers seeking customers will have just the opposite effect. Speculation has played a very small part in inducing the present condition of the iron markets; and a reduction of the duty to the lowest point consistent with the interests of the revenue, would not have the effect of making iron cheap any sooner than such a result would be brought about by the operation of the natural laws of trade. So far as the stove manufacturers are concerned, the only way in which they can protect themselves against loss is to agree upon a price for their goods which will enable them to replace the material they are using and make a little something besides. The policy of dividing with the consumer any advantage which may be gained in the purchase of materials at a comparatively low figure on a rising market, is well enough if it is not carried too far. These materials will have to be replaced at much higher figures, and the dealer will have more trouble than ever in understanding the reason for the necessary advance in the price of stoves.

Our trade report this week shows that in the local iron market there has been no important change since our last issue. The market is somewhat more quiet, and there is less disposition on the part of consumers to anticipate future requirements. There is no change in quotable prices, and nothing to indicate weakness. The arrivals of Scotch pig are small, and the slight decline on the other side is said to be offset by an advance in ocean freights. The current sales, though small, are considerably in excess of the arrivals, showing that stocks in yard are being reduced.

The Philadelphia market remains steady, without any change in prices. The demand is not large, but it is still in excess of the offerings, as the makers are filling contracts which will absorb their production for many months to come. There are no stocks on bank at the furnaces, and those best informed as to the condition and probable course of the market predict a very active demand a few weeks hence. We quote: No. 1 Anthracite, $41 @ $43; No. 2, $40 @ $41.

The Pittsburgh market remains very strong, the demand exceeding the supply and prices tending steadily upward. There is no apparent falling off in the consumption; on the contrary, it is increasing. No. 1 Foundry is quoted at $45; No. 2 at $42 @ $43.

The St. Louis market continues very strong and active, with prices stiffening at last advices. In Cincinnati the quotations for hot-blast Foundry Irons on the 26th were as follows:

Hanging Rock C. C., No. 1	$44.00 @ 45.00
" C. C., No. 2	42.00 @ 43.00
Southern C. C.	43.00 @ 44.00
" " No. 2	41.00 @ 42.00
Strong Coke	43.00 @ 44.00
" " No. 2	41.00 @ 42.00
Soft Stonecoal	39.00 @ 41.00
" " No. 2	37.00 @ 39.00
Open Silver Gray	38.00 @ 40.00

The Louisville quotations of the same date for Foundry Irons were as follows:

No. 1 Hanging Rock Charcoal or Coke	$43.00 @ 44.00
No. 2 " " "	41.00 @ 43.00
No. 1 Hanging Rock Coke	$42.00 @ 43.00
No. 2 " " "	40.00 @ 42.00
No. 1 Southern, Charcoal or Coke	41.00 @ 42.00
No. 2 " " "	40.00 @ 41.00
No. 1 Southern Coke	41.00 @ 42.00
No. 2 " "	40.00 @ 41.00
Silver Gray	37.00 @ 39.00
Scotch	40.00 @ 41.00

The Meeting of the National Association.

We have received the following notice:

NATIONAL ASSOCIATION OF STOVE MFRS.,
ALBANY, N. Y., Jan. 23, 1880.

DEAR SIR: In accordance with the resolution passed at the National Convention of Stove Manufacturers, held in Rochester January 15th, 1879, I beg to advise you that the next meeting will be held in New York, at the Fifth Avenue Hotel, on Wednesday, the 4th day of February, at 10 a. m.

It is most important that all the members who can be at the meeting should be there, as owing to the rapid advance of raw materials which go into the manufacture of our goods, matters of great importance to the trade will be discussed.

Through the kindness of Mr. J. L. Mott, arrangements have been made to hold our meeting at the Fifth Avenue Hotel, as it is a most central situation.

The regular price per day, including board and lodgings, is $4; and if you intend being there, it would be well to write the proprietors, Messrs. Hitchcock, Darling & Co., of your intention of being present at the convention.

Hoping that you will do all in your power to have your associates and other members of the trade attend this most important meeting, I am, yours very truly,

EDW. BOWDITCH, Secretary.

In view of the present condition and probable future of the stove business, this meeting of the National Association promises to be the most important which has been held for many years. We have no means of foreshadowing the discussion, but if it is not of exciting interest we shall be both surprised and disappointed. For some years past the question has been how best to avert disaster and make the best of conditions fatal to all hope of prosperity? Now a new set of problems are presented, equally important, but wholly different. Without a good understanding and an honest co-operation among manufacturers, it will be impossible for them to realize the largest possible benefit from the revival, for which so few of them were prepared.

This year a new and desirable feature will be introduced, in the shape of a subscription dinner, probably at Delmonico's. It will be remembered that the association decided to meet this winter in New York, without waiting for any invitation from the local trade, and that the sentiment of the membership seemed to be in favor of holding the meetings hereafter in this city, as the point at which the largest representation of the trade could be gathered. Naturally, those of the members who had given the matter thought saw that it would be improper to force themselves on the hospitality of the New York trade, by whom they had twice been entertained, and the suggestion of the subscription dinner was received with warm approval. The following letter from Mr. Edward Bowditch, to such of the trade as could be conveniently reached, has, we understand, been favorably received:

ALBANY, N. Y., January 24, 1880.

DEAR SIRS: It has been thought, in view of the fact that the National Association of Stove Manufacturers have chosen New York city as the place for holding its annual meetings in the future, that it would be better to have a subscription dinner, to be held on Wednesday evening, February 4, to which all the members should be asked, instead of saddling the manufacturers of New York city with the really onerous tax of entertaining the large number of our craft who are likely to be present at our annual meetings. An invitation will be extended to all present at the meeting, asking them to join in the subscription dinner; but as it will be necessary to have some idea as to how many will probably come to join in it, I have addressed a few of the prominent houses a similar letter to this, asking if any of their partners will care to attend the dinner, and to advise me at once. The price per plate, including wines, will probably be about $10.

Awaiting your reply, I am, yours truly,

EDW. BOWDITCH, Secretary.

Probably the subscription dinner will hereafter be a regular feature of the meetings. Indeed, it should have been introduced long ago. It insures a suitable entertainment at small cost to the individual members, and leaves the association free to meet where it will, without taxing any one to entertain them. We have no doubt that all who attend the meetings will be glad to participate in the dinner, which will be a memorable entertainment.

The United States Duplex Grate Company,

Pittston, Pa., send us a copy of the following circular:

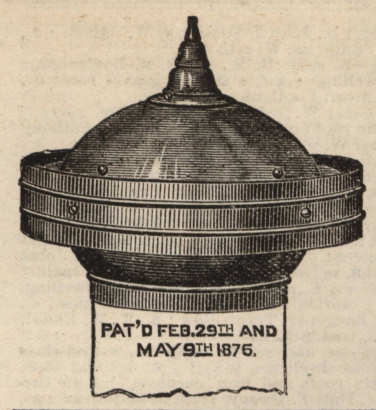
We invite your attention to the merits of Smyth's patent "Duplex Grate." It is no longer an experiment; for, after six years of the severest tests, it has proven to be excellent in every way, and with more than 200,000 now in use and every one giving perfect satisfaction, and the remarkable fact that not one has ever given out, is evidence of its durability. Hundreds assure us that with its use there is a saving of fully 50 per cent. of fuel; for there is no waste, and any kind or size of coal can be used. Another advantage peculiar to the Duplex Grate is that it is a perfect coal grate when in one position and a wood grate in another, which is a great convenience to many. It is fast coming into general use, as you will see by the list of prominent manufacturers now using it in our advertisement in *The Metal Worker*. For particulars and license to manufacture, address

THE UNITED STATES DUPLEX GRATE CO.,
Pittston, Pa.

The Canadian Tariff and the Stove Trade.

A correspondent, writing from Montreal under date of January 23d, sends us the following information of interest respecting the influence of the new tariff upon the Canadian stove business:

Our new tariff has now been in force about eleven months. The Conservative party carried the last elections on the strength of this tariff, which they pledged themselves to carry out, and there is no doubt but that it is a good thing for the country. Still, it does not go far enough. Our population of 4,000,000 is too much scattered to be supplied by Ontario manufacturers. You see we cannot send stoves, &c., to British Columbia, and anything wanted in Manitoba has to go through the States; and, considering all things, a great number of us Canadians have come to the conclusion that something has to be done, and that something takes us to either independence or annexation. I can assure you that you can speak to any twelve men you meet in our streets, and the answer from at least eight of them will be for one or the other of the above alternatives. This, you will say, is a pretty strong majority, and if it lay with the cities and towns to make the choice, they would not be long in doing it. But there is our country population of French Canadians, who are in the hands of their church to a great extent, and it is not likely that they would go in for the change. Our new tariff has raised the price of almost everything we use, and business is just as dull as ever. We do not earn enough to pay our way; and then if we look over to the United States, we see everything "booming," and we believe our country to be as good as yours. Therefore, the reason we are idle must be in our government, and that must be changed, if possible. The above will give you the ideas of the metal workers of Montreal, as I do not know one whom I have had any conversation with on this subject but has expressed himself in those terms.



GLOBE VENTILATORS & CHIMNEY CAPS.

Twenty Sizes. Made of Galvanized Iron.

SMOKY CHIMNEYS CURED!

Public and Private Buildings and Railroad Cars Perfectly Ventilated.

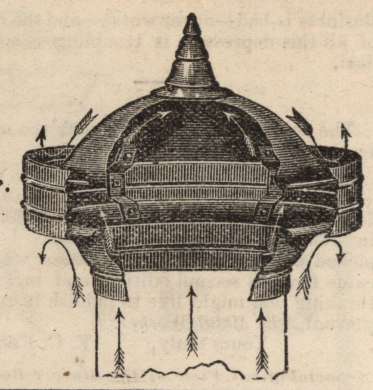
STATIONARY, ORNAMENTAL, NOISELESS, STORM PROOF, DURABLE, SIMPLE and CHEAP.

Send for Price List. Working Model sent on receipt of 20 cents, to pay postage. Manufactured and for sale by

GLOBE VENTILATOR CO.,

OFFICE, 203 River St., Troy, N. Y.

Wholesale Agents for New York City and vicinity, **ARENDROTH & ROOT MFG. CO., 28 Cliff St., N. Y.**
Wholesale Agents for Phila., Pa., and vicinity, **MERCHANT & CO., 525 Arch St., Phila.**
Wholesale Agent for Boston, Mass., and vicinity, **CHAS. M. BROMWICH, 613 Broadway,** S. Boston, Mass.
General Agents for Chicago and vicinity, **HAY & PRENTISS, 37 S. Canal, Chicago, Ill.**
Wholesale Agents for Louisville, Ky., **SMITH, BAGBY & CO., 167 First Street, Louisville, Ky.**



SMYTH'S PATENT
Duplex Grate.

After six years' trial the **Duplex Grate** has proved to be all that can be desired. It is durable, economical of fuel, and satisfactory in every way. The fact of its adoption into their best goods by such leading Stove manufacturers as

Ransom Stove Works, Albany, N. Y.,
Rathbone, Sard & Co., Albany, N. Y.,
Sherman S. Jewett & Co., Buffalo, N. Y.,
Bussey, McLeod & Co., Troy, N. Y.,
Co-operative Foundry Co., Rochester, N. Y.,
The Union Stove Works, Peekskill, N. Y.,
Black & Germer, Erie, Pa.,
Sheeler, Buckwalter & Co., Rogers Ford, Pa.,
Raymond & Campbell, Middletown, Pa.,
The Union Stove and Mfg. Co., Pittston, Pa.,
A. Bradley & Co., Pittsburgh, Pa.,
Isaac A. Shepard & Co., Philadelphia,
Shantz & Keeley, Philadelphia,
Barstow Stove Co., Providence, R. I.,
The Magee Furnace Co., Boston, Mass.,
The Stamford Foundry Co., Stamford, Conn.,
Schenectady Stove Co., Schenectady, N. Y.,
S. E. Olmstead & Co., Norwalk, Conn.,
J. Van Wormer & Co., Albany, N. Y.,
The Richmond Stove Co., Norwich, Conn.,
The Dighton Furnace Co., Taunton, Mass.,
The Walker & Pratt Mfg. Co., Boston, Mass.,
The Taunton Stove Co., Taunton, Mass.,
Wood, Bishop & Co., Bangor, Maine,
Smith & Anthony Stove Co., Boston, Mass.,
The Highland Foundry Co., Boston, Mass.,
Burdett, Smith & Co., Troy, N. Y.,
B. C. Bibb & Son, Baltimore, Md.,
Cox, Whiteman & Cox, Philadelphia, Penn.,
Co-operative Foundry Co., Somerset, Mass.,
The Taunton Iron Works, Taunton, Mass.,
Portland Stove Foundry Co., Portland, Maine,
Ely & Ramsay, New York,
Peck, Howard & Co., New York,
March, Brownback & Co., Limerick, Penn.,
Orr, Painter & Co., Reading, Penn.,
Bishop & Gavitt Stove Co., Attleboro, Mass.,
W. J. Keep, Troy, N. Y.,
Brand & Co., Milwaukee, Wis.,
Andrew B. Fales, Troy, N. Y.,
Potter & Co., Troy, N. Y.,
Corse & Co., Troy, N. Y.,
Swett, Quimby & Perry, Troy, N. Y.,
The Wolfe Stove Co., Troy, N. Y.,
and others,

insures its universal introduction, and is evidence of its great popularity where best known. We refer with pleasure to any of the above-named firms for facts in regard to the **Duplex Grate.**

We also invite your attention to

SMYTH'S
New Furnace Grate

with which the ashes and clinkers can be removed instantly by one motion of a lever, with the furnace entirely closed, and with which a continuous fire can be kept for any length of time. For information, or for license to manufacture, address

U. S. Duplex Grate Co.
PITTSTON, PA.

WESTON DYNAMO-ELECTRIC MACHINE
NICKEL.

The rapid increase in the use of Nickel-Plating owing to the introduction of the Weston Machine and the very low price of nickel material, enables us to give greatly reduced estimates for complete outfits.

We are furnishing outfits specially adapted for Stove Work, giving a pure white deposit on plain or mat surfaces.

Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., &c., $250.

We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co. Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto and many others.

INFRINGEMENTS.

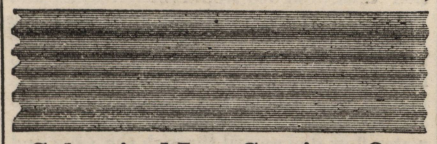
We call attention to infringements of the Weston Machine, in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

CONDIT, HANSON & VAN WINKLE
Sole Agents *NEWARK, N.J. U.S.A.*
ENGLISH AGENCY, 18 Caroline St., Birmingham.

Send for circular.

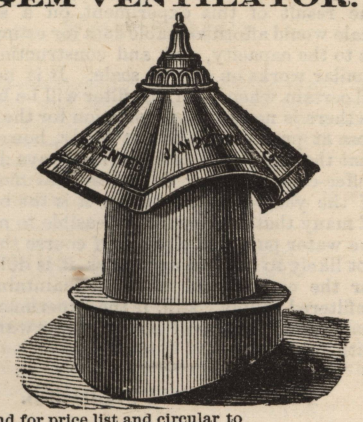
Keystone Portable Forge Co.,
218 Carter St., Philadelphia.

A. KNISELY & CO.,
Manufacturers of
CORRUGATED IRON,



Galvanized Iron Cornices, &c.,
AND THE
HAYES SKYLIGHTS (under license).
ROOFING, SLATE, FELT, &c.,
For sale and put on.
72 & 74 W. Monroe Street, CHICAGO.

GEM VENTILATOR.



Send for price list and circular to
GEM VENTILATOR CO.,
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OLD METALS

PURCHASED BY

DAN'L W. RICHARDS & CO.,
Scrap Iron
AND
METAL DEALERS,
88 to 96 Mangin Street, N. Y.

SEND FOR QUOTATIONS.

POLISHING FELT.

We manufacture **WOOL FELT** of any quality, size, thickness or firmness in

SHEETS OR WHEELS,

FOR BUFFING AND POLISHING

NICKEL WORK ON STOVES, METALS,

STONE, WOOD, &c.

TINGUE, HOUSE & CO.,
56 Reade Street, NEW YORK CITY.

EXCELSIOR STOVE WORKS

MANUFACTURE

"Excelsior Cook," "Monumental Cook," "Enterprise Cook," "All Right Cook," all A. 1.

Also a variety of low-priced Cooking Stoves—"MINERVA," "COLUMBIA," "SIGNET," "ARION," "WASHINGTON," and a large assortment of Portable Ranges, in size, style and price to meet the demands of all classes. Also a large assortment of HEATING STOVES, adapted to all kinds of fuel. EXCELSIOR RANGES (Brick Set), Twelve Sizes Plain, and Eight Sizes Hot-Air, arranged to heat a room above. This is doubtless the most popular (Brick Set) Range ever made. EXCELSIOR HOT-AIR FURNACES, both Portable and Brick Set, Seventeen Different Sizes. Will give more heat in proportion to cost than any Furnaces in the market. SOIL PIPE heavy and light. SINKS of all sizes, and a large variety of PLUMBERS' GOODS. Also a complete assortment of Plain and Galvanized HOLLOW WARE, PLANTATION HOLLOW WARE, FARMERS' BOILERS, and MISCELLANEOUS GOODS. If you want the best Goods, at reasonable Prices, send for Circular and Price List to

ISAAC A. SHEPPARD & CO.,
N. E. Corner Fourth St. and Montgomery Ave.
PHILADELPHIA, or S. W. corner Eastern Avenue and Chester Street, BALTIMORE.

SUPERIOR QUALITY
North Carolina
MICA

We are prepared to furnish

Stove Manufacturers,
Oil Stove Manufacturers,
Jobbers & Retail Dealers,

WITH

MICA

of very best quality.

Estimates furnished on application.

J. S. & M. PECKHAM, Utica, N. Y.,
Miners and Wholesale Dealers in Mica.

MICA!

THE CHESTER MICA & PORCELAIN CO.

MICA
Of best quality,
Of all sizes,
Cut to any pattern,
In quantities to suit,
At lowest prices.

No. 87 LIBERTY STREET, NEW YORK.

Assorted Packages North Carolina
MICA.

PREPARED EXPRESSLY FOR THE RETAIL TRADE.

2 lb. Package, Containing 8 Sizes,	¼ lb. 2 x5 " 3 x6	¼ lb. 4 x5 " 2½x4	¼ lb. 5 x7 " 3 x4	¼ lb. 3 x5 " 2½x5	Price **$6.00**
3 lb. Package, Containing 12 Sizes	¼ lb. 3 x6 " 2 x5 " 4 x7	¼ lb. 3 x5 " 3 x3 " 4 x5	¼ lb. 2½x5½ " 3½x4½ " 3 x4	¼ lb. 2½x4½ " 2 x4 " 5 x8	Price, **$8.50**
4 lb. Package, Containing 16 Sizes	¼ lb. 4½x5½ " 3 x4 " 2½x5½ " 3 x6	¼ lb. 3½x5½ " 2 x3 " 3 x5 " 3 x3	¼ lb. 2 x4 " 5 x7 " 2½x4 " 3½x4	¼ lb. 2½x3½ " 4 x5 " 2 x5 " 6 x7	Price, **$11.00**

Above Price Net Cash—No Discount. These Packages Delivered Free to any part of the United States.

MUNSELL & BROOKS, 115 Beekman st., New York.

Business is bad—never worse—and the cause of all this depression is troubling us a good deal.

Alas!

The poetry "boom" has struck the manufacturers, as witness the following:

ELMIRA, N. Y., January 27, 1880.

Editor of The Metal Worker.—DEAR SIR: I have seen the poem in *The Metal Worker* in relation to the stove boom. I have picked up, not pretending to know where it came from, a second edition, and inclose it, thinking you might like to publish it in your journal, *The Metal Worker*.

Yours truly, E. C. FROST.

A Sociological View of the Stove "Boom."

(Second Edition.)

SALLY ANN AND BILL MADE HAPPY.

Again we find her on his knee.
Her countenance has met with a great change;
No "downcast eyes" do now appear,
No gesters showing any doubts are seen.
Her "coral lips" so tightly pressed,
Now reach his cheeks with double force,
Plainly showing all former doubts have disappeared,
And that he was her's beyond a doubt.

"Why, Sally Ann! what on earth—pray, tell me quick—
Has caused this joyfull change?
Pray, tell me soon, while I hug you close.
The happy countenance you show
Imparts to me a joyfull, joyfull glee.
Has that 'stove boom' that chilled our joys
Passed over? Or what els can it be
That creates and imparts your happiness to me?"

"Why, Bill, that 'stove boom' was true;
But, thank Heaven! it only applied to the old-process stoves,
That cooks and bakes by radiation only;
That dries, wastes and burns, making all unhealthy;
That *Harper's Bazar* truly says
Kills more Americans than war, pestilence and famine,
And the Boston *Gazette* calls the Mother of Dispepsia.
Hence, I am glad they 'boomed,' for we don't want them.

"Now, Bill, I have found jest what we want,
I am happy to inform you.
It is the Frost new-process range or stove,
Which saves half in cost and two-thirds in fuel;
One-half in meats, chemists say, and all are healthey
It cooks and bakes all by deflection;
Not by cremation and destroying radiation.
This knowledge is jest what makes me so happy,
The old-process stoves have boomed and are very dear.

"I shall not have to watch and turn dishes and dampers
To keep one side from burning and the other being raw,
As St. Louis Filley said the old-process range requires,
And Troy Keep the same about the stoves,
Which you can find in *The Metal Worker*.
But I can put in my dishes,
And then can plant myself upon your knee,
Your pleasant arms my waiste enclose,
And mine with you to corespond.

"Ah, Bill, what happy, happy hours
This new-process range will bring us.
The fifty dollars we shall save each year,
Compared with other stoves and ranges,
Will amount to an ample sum
To furnish us liberal and fine holiday presents."

Steam Heat for Baltimore.

A certification of incorporation has been filed for record in the Clerk's office of the Maryland Superior Court by the Steam Heating and Supply Company of Baltimore city, with George G. Presbury, of New Jersey; D. Steward Denison, of New York; Wm. J. Montague, Charles D. Fisher and Howard Munnikhuysen, of Baltimore, corporators. It is formed for the purpose of manufacturing and furnishing steam to the people of that city in their residences and places of business for heating, domestic and mechanical purposes, and other uses for which steam can or may be employed, conveyed through pipes laid in the street, avenues, alleys, and byways of the city, and for the purpose of manufacturing all or any pipes, machinery, radiators and fixtures to be used in the business. The aggregate of the capital stock is to be $1,000,000, divided into 10,000 shares of the par value of $100. It will be managed by a board of five, who for the first year are the gentlemen named above.

J. C. Jacoby,

known to the stove trade as manufacturer of "Jacoby's Brilliant Self-Shining Stove Polish," has again resumed this business after an absence of one year, and has established an office at 57½ Vesey street, N. Y. His factory is in Newark, N. J. Mr. Jacoby depends for the success of his preparation on the use of perfectly pure and fine plumbago, using no varnish or lacquer, and consequently having nothing to evaporate or make unpleasant smells when the stove is heated.

Trade Union Picketing.

The decision lately rendered by Judge Ball, at Zanesville, Ohio, involving the right of trade unions to have recourse to picketing in case of strikes, has interest alike for manufacturers and members of the Molders' Union. The occasion of the decision was briefly as follows: Messrs. Kearns, Herdman & Gorsuch, of Zanesville, proprietors, endeavored to persuade their blowers to make more glass per week than the rules of the union allowed. They refused. The firm had no other trouble with their men, but quietly sent to Belgium and engaged, for the term of three years, under a contract, a number of Belgian blowers. A few days before their arrival the men in their employ were paid off and discharged. When the Belgians began work trouble was feared, and an injunction was issued forbidding the Glass Blowers' Union from interfering with the Belgians. A motion was made by the glass blowers to dissolve or modify the injunction in their interest, which was refused, and, indeed, it was made stronger. The main question at issue was the right of "picketing," or, as expressed by Mr. Swearer, the president of the Glass Blowers' Union, the right to solicit the Belgians, by fair and legal means, not to make more than forty-eight boxes of glass per week. Judge Ball, in his decision, restrains them from even enticing any employees of the glass manufacturers by conversation, writing, offers or otherwise. This decision, as it was telegraphed, seemed absurd and the strictures upon it justified; but the full text abundantly justifies the decision, and shows Judge Ball to have been in the right. The position assumed is that the Belgians are working under a contract, and the object of the union is in effect to prevail upon them to break this contract, which would be an unlawful act, and, consequently, the solicitation of the union would be illegal and unlawful. In this view the decision is justifiable.

It will be noticed, however, that the question of "picketing" under circumstances such as generally exist—that is, when there is not a contract—is not touched upon, unless the remark in the decision that the union is in conflict with the laws of the States and of the United States, may be so regarded. Judge Ball certainly could not have meant by this that trades unions are in opposition to the laws. Such a position is not tenable for a moment, nor are the beneficial features of such organizations unlawful. His remark can only refer to the features of the rules that bear on strikes, and, consequently, their reference to picketing.

Smoke in Cincinnati.

An organization known as the Ladies' Association of Cincinnati have sent to the Board of City Commissioners the following pathetic memorial:

"*To the Board of City Commissioners:* The association of ladies for the promotion of the cleanliness of the city beg leave to again call the attention of your board to the subject of smoke consumption at the City Water Works.

"Since we last submitted our views to your board the Jury Reports of the Cincinnati Exposition have been published, and it has been thus publicly made known that there are at least five or six methods of consuming the smoke in steam furnaces which are thoroughly practical and economical. Some of these can be adapted to ordinary steam boilers at so trifling an expense that there can be no reasonable obstacle to their general use.

"The possibility of rescuing our city from the reproach of being one of the dirtiest of the world has, therefore, passed from this condition of doubt or of experiment to that of complete and proven feasibility. What is needed is that this should be brought to the attention of private manufacturing establishments by prominent public examples in successful operation.

"It has been proven that a large economy in fuel may be made, besides saving the city from the defilement of great clouds of soot, if your board will direct one of the several successful smoke consuming devices to be applied to the furnaces of the water works under your control.

"We therefore again appeal to you to comply with the general wish of the citizens of Cincinnati, and set the example of a hearty effort for a reform which alone would make the city one of the most attractive on the continent.

"We hand herewith a copy of the report of the jurors and committee of the Exposition showing the complete success, economy and business advantages of the several devices passed upon by them."

We fear that the dear ladies have availed themselves of their right to "jump at conclusions" in this matter. Probably they will never learn that to consume smoke is practically an impossibilty. The solution of the problem depends wholly upon the completeness of the combustion, which is not easily secured with a durable construction for soft coal. This is a many-sided problem, and its solution will never be reached by the simple expedient of "be it enacted" or "resolved."

Potter & Co.,

Troy, N. Y., send us a circular announcing that Mr. Geo. W. Graves, for the past nine years connected with the Ransom Stove Works, has been admitted to a partnership in their firm. They further say: "We would also take this opportunity to notify the trade that we shall have ready, at an early date, several new and desirable patterns of ranges, also coal and wood cooks, containing features not found in any patterns now on the market, which, when taken in connection with our present large assortment, gives us a line of stoves and furnaces that we think will meet all the requirements of the trade."

Filtering the Mississippi Water.

The St. Louis *Republican* says: Plans and drawings are now nearly completed in the office of the president of the board of public improvements for the construction of a filter to be used at the water works to clear the sediment from the water raised by the pumping engines. The matter is, to a certain extent, an experiment, but it possesses an undoubted interest for all who use water from the city mains. As is well known, the original plan for the construction of the St. Louis water works contemplated the construction of extensive filter-beds, to be located on the level ground west of the settling basing, and to be used in clearing all the water delivered to the city whenever the ordinary process of settling should prove insufficient. Such an apparatus would, of course, involve great expense, and there has always been a question as to the plan on which these filter beds should be constructed. The amount of sediment carried in the waters of the Missouri and Mississippi rivers is so great that the filtering presents greater difficulties than are met in any of the European cities in which the process is applied. One of the great difficulties lies in the necessity for frequent cleaning of the filters and the trouble and cost attendant thereon. As stated above, the experiment contemplated now will only affect the supply required to run the engines at the works, but it may, nevertheless, be of importance in determining the plan on which filters for the city supply will eventually be built. The plan under consideration is an adaptation of the process of upward filtration. The filtering apparatus consists of a reservoir 25 feet square, having an iron grate near the bottom on which is a layer of coarse gravel, covered with layers of finer gravel, over which is placed 14 inches of clean sand. The water is let in below and filters upward through the gravel and sand, and is drawn off from the reservoir above for use. There is no doubt that the filtration thus designed would be effectual and would deliver the water pure and clear. The principle is in use in small filters for house use, and the main benefit as applied to the muddy water of St. Louis lies in the facility with which the apparatus can be cleaned. This is accomplished by letting the water flow downward through the sand and gravel under a moderate pressure, which is easily obtained. The sediment, which nearly all lodges in the lower strata of the filter, is quickly washed out, and the filter bed does not require to be changed often. It is expected that the projected filter, with a surface 25 feet square, will deliver sufficient water to supply the engines, and of course the result of this experiment on a small scale would afford valuable data for estimates as to the capacity, cost and construction of similar works on a large scale. It is not at all certain when even this filter will be built, as there is not any appropriation for the purpose at present. It is not likely, however, that the people of this city will always drink coffee-colored water during several months of the year, especially when it is the belief of many that it is perfectly feasible to make the water pure and clear. Of course this is not likely to be done as long as it is difficult for the city to find money to maintain the unfiltered supply; still, if the experiment is made, the results will be looked forward to with interest.

PROJECTED BUILDINGS.

New York.

NOTE.—In these lists "o." stands for owner, "b." for builder, "a." for architect, and "c." for carpenter.

Plan 49—244 8th av., rear, 1 brick workshop, 19x15, 1 story, tin roof; o., Wm. Bawdon, on premises; b., O. E. Perrine, 308 W. 20th st.; cost, $400.

Plan 50—N. s. 127th st., 150 ft. e. 8th av., 6 brownstone dwellings, 16.8x50, 3 stories and basements, tin roofs and iron cornices, Baltimore heaters; o., S. Stevens, 21 Beekman st.; a., Wm. Josie; cost, $6,500 each.

Plan 51—85 Allen st., 1 brick ten't and stores, 25x54, 3 stories, tin roof and iron cornice; o., Mrs. Maria C. Cadwaleder; a., Julius Borkell, 54 Bond st.; cost, $6000.

Plan 52—1020 3d av., 1 brick ten't and store, 25x68, 5 stories, tin roof and iron cornice; o., Wm. Ahlborn, 1015 3d av.; a., Julius Borkell, 54 Bond st.; cost, $12,000.

Plan 53—N. w. cor. Park av. and 68th st., 1 brick dwelling, 36x67, 4 stories and basement, tin roof and iron cornice, hot-air furnace; o., A. H. Stevens, 14 E. 29th st.; a., G. E. Harney, 149 Broadway; b., John J. Tucker, 37 W. 12th st.; c., Bartlett Smith, 220 W. 29th st.

Plan 54—W. s. H. R. R., 300 ft. n. Boulevard, 1 frame dwelling, 24x16, 2 stories, gravel roof; o., Amelia Oliver, Fordham; cost, $550.

Plan 55—253 W. 42d st., 1 brick office, 25x15, 2 stories, tin roof; o., John Rodenberg; a., Anthony Phund, 232 W. 36th st.; cost, $1800.

Plan 56—266 Av. C, rear, 1 brick workshop, 20x22, 2 stories, tin roof and iron cornice; o., Thos. Hastings, 265 Av. C.; a., Wm. Graul; b., John Keech, 622 E. 17th st.; cost, $800.

Plan 57—25 and 27 7th st., 2 brick and stone trimmed tenements, 26x65, 5 stories, tin roofs and iron cornices; o., I. W. Miller, 41 7th st.; a., Jobst & Hoffman, 19 Union Square; cost, $11,000 each.

Plan 58—103 E. 10th st., 1 brown-stone dwelling, 32x84.6, 5 stories, tin roof and iron cornice; o., Dugro & Raegener, Tryon Row; a., T. W. Klemt, 39 1st st.; cost, $18,000.

Plan 59—206 and 208 E. 116th st., 2 first-class brown-stone dwellings, 20x55, 3 stories and basements, tin roofs and iron cornices, hot-air furnaces; o., Thos. F. Treacy, 135th st. and 6th av.; a., L. W. Romain, 1514 Broadway; b., James A. Frame; c., Samuel Wright; cost, $15,000.

Plan 60—243 E. 79th st., 1 brown-stone dwelling, 11.8x26, 4 stories and basement, tin roof and iron cornice; o., A. M. Heins; a., J. D. Heins; cost, $5000.

Plan 61—128 and 130 W. 31st st., 1 brick and iron front music hall and hotel, 51x142, 2 stories, tin and slate roof and iron cornice, steam heaters; o., D. Mc. Quien, 23 W. 14th st.; a., A. M. Townley, Jr., 206 W. 21st st.; cost, $20,000.

Plan 62—342 and 344 E. 52d st., 2 brown-stone ten'ts, 20x64, 5 stories, tin roof and iron cornice; o. and a., Dennis Loonie, 175 E. 70th st.; b. and c., not selected; cost, $12,000.

Plan 63—346 E. 52d st., 1 brown-stone ten't, 30x64, 5 stories, tin roof and iron cornice; o. and a., Dennis Loonie; b. and c., not selected; cost, $16,000.

Plan 64—E. s. Walton av., 96 ft. n. 150th st., one frame dwelling, 18x28, 2 stories, tin roof; o., E. C. Van Tassell, Walton av.; cost, $1800.

Plan 65—W. s. 3d av., 100 ft. s. 140th st., 1 store and dwelling, 11.6x48, 1 story, gravel roof; o., W. T. Estabrook, 3d av., near 140th st.; cost, $900.

Plan 66—W. s. 11th av., 50 ft. n. 21st st., 1 brick store, 24.8x65, 4 stories, tin roof and iron cornice; o., John McClave, 155 11th av.; cost, $6000.

Plan 67—W. s. 51st st., 55 ft. e. 7th av., 1 brick store, 17.3x22, 1 story, tin roof, wood cornice; o., Charles Loughran, 125 E. 124th st.; c., Patrick Small, 155 W. 151st st.

Plan 68—S. e. cor. Jane st. and 13th av., 1 brick factory, 70x80, 4 stories, gravel roof, steam heaters; o., Mallon & Rourke, on premises; a., Geo. J. Carey, 36 Bowery; cost, $7000.

Plan 69—N. s. 81st st., 175 ft. w. 2d av., 2 apartment houses, 25.5x62, 4 stories, tin roofs and iron cornices; o., C. W. W. Loeffler, 113 E. 77th st.; a., J. C. Burne, Parepa Hall, 3d av.; b., James A. Frame, 107 E. 70th st.; cost, $12,000.

Plan 70—S. s. 85th st., 75 ft. w. 1st av., 1 brown stone apartment house, 25x64, 4 stories, tin roof and iron cornice; o., O. W. Loeffler, 113 E. 77th st.; a., J. C. Burne, Parepa Hall, 3d av.; b., J. A. Frame, 107 E. 70th st.; cost, $12,500.

ALTERATIONS.

Plan 52—409 8th av., to build brick ext'n, 25x50, 2 stories, tin roof; o., John Peiser, 409 8th av.; a., Thom & Wilson, 1298 Broadway; c., C. W. Klepparts, 328 E. 25th st.

Plan 53—123 W. 26 h st., to build brick ext'n, 10x7, 1 story, tin roof, as boiler and engine room; o., Clementh & Brown, on premises; c., Conklin & Kipp, 33d st., near 6th av.

Plan 54—385 6th av., to build brick ext'n, 24x28, 1 story, tin roof; o., John Grayhurst; a., John Fetterecht; c., Thomas Sayers, cor. 7th av. and 25th st.

Plan 55—265 Av. C, to take out piers in 1st story and put in iron T lintel; o., Thomas Hastings, on premises; a., William Graul, 12 Stanton st.; b., John Keech, 622 E. 17th st.

Plan 56—E. s. Lafayette Place, 161 ft. s. Astor Place, to build brick ext'n, 65x100, 3 stories, tin and fire-proof roofing, and connect same with Astor Library; o., John J. Astor, for trustees of library; a., Thos. Stent, 65 Astor House; b., Marck Eidlitz, 308 E. 59th st.; c., John Downey, 407 W. 33d st.; cost, $200,000.

Plan 59—563 1st av., to build brick ext'n, 14x22, 1 story, tin roof; o., Louis Barnett, 122 Baxter st.; c., Philip Kattlowsky, 75 Mott st.

Plan 60—234 E. 46th st., to make internal alterations and enlarge windows; o., J. Etinger, 234 E. 46th st.

Plan 61—506½ and 508 Water st., old fronts to be taken out and new iron lintels and new store fronts put in; o., Wm. Braach, on premises; c., L. Antonius, 65 Broome st.

Plan 63—N. e. cor. Fulton and Washington sts., to remove corner post and replace it with 8-in. iron column, and put in walnut and plate-glass doors and windows; o., H. J. Blendeman, on premises; a., J. E. Walker, 2 Staple st.

Plan 64—70 Hester st., to add ½ story on frame dwelling and substitute flat tin roof for present peak, iron cornice; o., A. Horschfield, 207 W. 45th st.; a., M. Dooly.

Plan 65—1654 and 1656 2d av., to build 2 brick ext'ns, 7.8x9, 4 stories, tin roofs; o., Henry Heins, cor. 86th st. and 2d av.; a., John Cook, 413 E. 113th st.

Plan 66—108 E. 119th st., to build brick ext'n, 25x8, 2 stories, tin roof; o., F. W. Boehlk, on premises.

Plan 67—147th st., n. w. cor. Concord av., to add ½ story on frame dwelling, mansard roof; o., Geo. C. Glacius, Cypress av.

Plan 68—47 E. 27th st., portion of side wall to be removed and put in iron columns and lintel; o., Stephenson Co., Limited, on premises; a., M. C. Merritt; b., Alexander Brown.

Plan 70—339 Greenwich st., cor. Jay, to take out 1st tier of beams and replace with new; also, cut 5 ft. opening and put in iron girder; o., John H. Mohlmann, 199 Duane st.; a., Wm. Graul, 12 Stanton st.

Plan 73—25 Chambers st., running through to Reade, to add 2 stories on brick dwelling and offices, steam elevator and steam heaters; o., Myer Finn, 339 Broadway; a., J. F. Duckworth, 291 Broadway.

Plan 76—162 E. 87th st., to build brick ext'n, 16.8x12, 2 stories, flat tin roof; o., J. R. Dalton, on premises; c., B. Oakley, 330 E. 84th st.

Plan 77—S. s. 47th st., 150 ft. w. 2d av., to build brick ext'n, 10x16, 1 story, tin roof; o., Christian Felthouse, on premises; a., J. Goeletze, 887 1st av.

Plan 78—132 Greenwich st., to remove iron column and put in new show windows; o., A. Blimer, on premises; b., Thos. Healey, 90 New Church.

Brooklyn.

Plan 37—S. s. Dikeman st., 100 ft. w. Conover st., 1 frame stable, 50x20, 2 stories, gravel roof; o., H. M. Thorman, 208 Conover st.; c., Christopher Hoffman, Tompkins av.

Plan 38—W. s. Waverly av., 150 ft. s. Green av., 1 brick stable, 17.6x58, 3 stories, tin roof; o., O. S. Baldwin, 397 Clinton av.; a., J. S. McRea, 104 S. Oxford st.; c., Wright & Brooks, 104 S. Oxford st.

Plan 39—N. s. Montrose av., 100 ft. e. Bushwick Road, 1 frame factory, 30x25, 2 stories, gravel roof; o., Barbara Grimfelder, 237 Montrose av.; c., Bernard Grimfelder.

Plan 40—N. s. 18th st., 175 ft. w. 3d av., 1 frame dwelling, 18.9x34, 2 stories, gravel roof; o., John Mahony, 118 12th st.

Plan 41—N. w. cor. Bushwick av. and Johnson av., 1 frame dwelling, 25x52, 3 stories, tin roof; o., M. Levy, cor. Graham av. and Ten Eyck st.; a.,

Theodore Engelhardt, 14 Fayette st.; c., Michael Metzen, 300 Ainzlie st.

Plan 42—N. w. cor. Bushwick av. and Boulevard, 1 frame stable, 25x14, 1 story; o., M. Levy, on premises.

Plan 43—N. s. 12th st., 75 ft. w. 3d av., 1 frame stable, 20x20, 1 story, gravel roof; o., E. Tewell, 12th st., cor. 3d av.; c., C. A. Gilderslieve, 135 Prospect av.

Plan 44—W. s. Nostrand, 200 ft. n. DeKalb av., 5 frame dwellings, 17.10x42½, 2 stories and attic, tin roofs; o., F. J. Buckenberger, 95 Pulaski st.

Plan 45—S. w. cor. Bond and 3d sts., 1 frame box factory, 90x35. 1 story, gravel roof; o., R. W. Adams; b., Peter Donelan.

Plan 46—Manhattan av., cor. Milton st., 3 frame stores, 32x85, 1 story, gravel roof; o., Thos. C. Smith, 120 Milton st.; c., John Fallon, 103 Oakland st.

Plan 47—S. s. 39th st., 200 ft. e. 2d av., 2 frame dwellings, 20x35, 2 stories, gravel roofs; o. and b., Stafford & Doyle, 12 Tillery st.; c., H. Stafford, 13 Elm st., N. Y.

Plan 48—N. e. cor. Kent av. and Kosciusko st., 1 brick store and dwelling, 24x50, 3 stories, gravel roof; o., Chas. Fasnan, Skillman st.; a., Edward Van Voorhis, 162 Franklyn av.; b., Patrick Kernan, 159 Sandford st.

ALTERATIONS.

Plan 30—15 Covert st., to build frame ext'n, 14x12, 1 story, gravel roof; o., Thomas Bennett, 213 Fulton st., N. Y.; c., F. Kelly.

Plan 31—260 Mauger st., to repair brick ice house and put in iron girder and columns; o., Michael Seitz; a., Charles Stoll; c., Frank Berlenbach.

Plan 32—8 Sand st., to build brick ext'n, 10x22, 2 stories, tin roof; o., Noah Sellick, Staten Island; b., John Demott & Sons; c., John Moore, 288 Schermerhorn st.

Plan 33—207 Park av., to build brick ext'n, 25x20, 1 story, tin roof; also put in iron girder in first story; o., J. Crawford, N. Y.; c., Long & Barnes, 86 Clermont av.

Plan 34—56 1st Place, to build brick ext'n, 22x10, 2 stories, tin roof; o., John Kernan, on premises; c., Eli Osborn, 249 Degraw st.

Plan 35—N. s. Devoe st., 125 ft. w. Leonard st., to excavate cellar and build in brick and stone found'n 18 in. thick; o., M. Oldhouse, on premises; b., G. Welsh, 127 Ellery st.

Plan 36—278 14th st., to build brick ext'n, 3x28, 2 stories; o., Joseph Fields, on premises; c., Jas. Crocker, 539 5th av.

Plan 37—17 Clermont av., to add 1 story on frame dwelling and substitute flat tin roof for present peak; o., Francis Rismayer, on premises; b., C. L. Johnson, 56 9th st.

MECHANICS' LIENS.

New York.

Jan. 27—Cottage st., known as 200 Cottage st., Mott Haven; Henry K. Wiegand agt. Ann J. Hawk, owner, and L. C. Sandford, debtor—claim, $45.

Jan. 26—83d st., n. s., commencing 100 ft. e. Lexington av., and extending 130 ft., No. 141 to 151; Chas Huber agt. J. M. & E. A. Thorpe, debtors, and B. C. Wandell, owner—claim, $253.

Jan. 29—80th st., n. s., commencing 130 ft. w. Lexington av., and extending 75 ft.; Messrs. Shepherd & Thompson agt. John P. Kuhn & Geo. Kuhn, reputed owners—claim, $152.80.

Jan. 29—4th av., n. e. cor. 110th st., and extending 155 ft. on st. and 100 on av.; Samuel & John R. Geleton agt. M. A. Cockburn, or Cuddington, owners and debtors—claim, $287.

Jan. 24—Lafayette Place, w. s., known as No. 47; James McGlouhlan agt. Wm. H. Mallory & Bro., owners, and Austin Gibbons, contractor—claim, $359.52.

Jan. 24—The same last-described property; Francis Mitchell agt. the same—claim, $90.

Jan. 24—The same; Messrs. Johnson Bros. agt. the same—claim, $110.

Jan. 24—The same, Messrs. W. H. & Theodore P. Jenkins agt. John Doe, reputed owner and Austin Gibbins, debtor—claim, $391.

Jan. 29—The same, Messrs. Decker & Rapp agt. W. H. Mallory & Co., owners, and Austin Gibbins, contractor—claim, $246.39.

Jan. 29—The same, Messrs, Decker & Rapp agt. W. H. Mallory, owner, and Austin Gibbins, contractor—claim, $202.71.

Jan. 23—124th st., s. s., commencing 60 ft. e. Lexington av. and extending 21.4; John Barry agt. Henry A. and Samuel A. Merritt, owners, and Robert Hall, contractor—claim, $225.

Jan. 29—110th st., n. e. cor. 4th av., 150 ft. on st. and 100 ft. on av.; Samuel and John R. Gelston agt. M. A. and E. H. Cockburn and Cuddington, owners; claim, $287.

Jan. 24—16th st., s. s., bet. Avs. B and C, known as 614 and 616; Joseph McNamara agt. Ella J. Van Horn, reputed owner—claim, $176.

Jan. 23—23d st., s. s., bet. 6th and 7th avs., No. 114; John McClave agt. Messrs. West and Anderson, lessees, and John A. Wyman, contractor—claim, $104.52.

Jan. 24—Wall st., n. s., n. e. cor. William st., No. 48; William Moller agt. Austin Gibbins, sub-contractor, and Bank of the State of New York owners—claim, $1343.

Jan. 24—The same last described property; J. F. Gibbons & Co. agt. the same—claim, $312.50.

Jan. 24—The same; Wm. Moller agt. the same—claim, $1893.

Jan. 26—The same; C. B. Keogh & Co. agt. the same—claim, $539.

Plan 27—The same; Plowden Stevens agt. the same—claim, $781.

Brooklyn.

Jan. 24—S. s. Hayward st., 75 ft. e. Lee av., thence e. 72x100; also s. s. Hayward st., 183 ft. e. Lee av., thence e. 90x100; William F. Purcell agt. John Davis, Christian Zanzer and Henry B. Fauton, debtors, and John Davis, Christian Zanzer and Marcus L. Videtto, owners—claim, $449.

Jan. 27—S. s. Hayward st., 183 ft. e. Lee av., thence e. 90x100; Messrs. Curran & Cooper agt. John Davis, Christian Zanzer and Marcus L. Videtto, debtors, and John Davis, Christian Zanzer, Marcus L. Videtto, Edward Pierpont, Eliza A. Fenton and C. Tremble, owners—claim, $1400.

Jan. 28—N. s. President st., 146 ft. e. Court st., thence e. 46x100; H. S. Christian agt. T. W. Rollins and P. H. Krulder, debtors, and H. C. Drake, owner—claim, $441.47.

Jan. 20—E. s. Waverly av., 137 ft. n. Gates av., thence n. 40x100; the New York Stone Contracting Co. agt. Jos. J. Kirby, debtor and owner—claim, $120.85.

Jan. 23—N. s. Atlantic av., 25 ft. e. Van Sinderien av., thence e. 70x97.6; Benj. T. Robbins agt. C. B. Le Barron, owner and debtor—claim, $800.

Jan. 22—S. s. Fulton av., 125 ft. e. Schenectady av., thence e. 25x100, No. 1682; John McCourt agt. Robert Gibbons, debtor, and Mrs. G. Schilling, owner—claim, $20.

Jan. 22—W. s. Brooklyn av., 42 ft. n. Bergen st., thence n. 64x62.6; Christmas & Ross agt. Samuel Peden, Jr., debtor, and Jordo L. Snedecor, owner—claim, $400.

Jan. 28—N. s. Macon st., 141.4 ft. w. Gates av., thence w. 123.8x100; Andrew Walker agt. Sarah H. Wilkinson, debtor and owner—claim, $500.

Judge Watts has granted an injunction prohibiting the city of Belleville, Ill., from proceeding with the construction of water works.

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GEORGE HAYES,
71 Eighth Avenue, New York.
January 1, 1880.

By his Attorney and Counsel,
JAS. H. WHITELEGGE, 136 Chambers St., N. Y.

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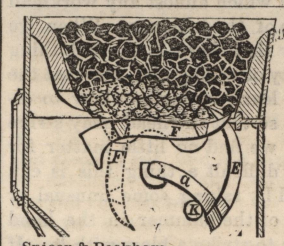

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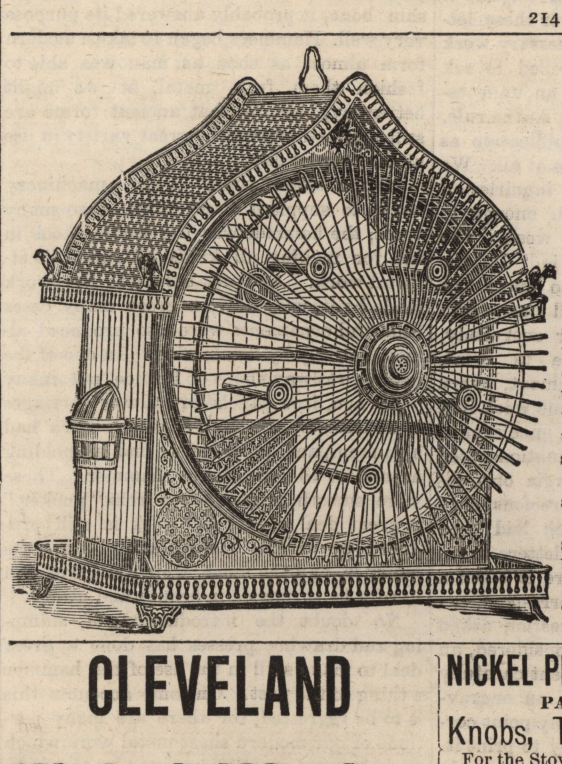

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THE METAL WORKER AND Stove & Tin-Trade Journal WITH WHICH IS INCORPORATED THE SHEET-METAL BUILDER

New York, Saturday, January 31, 1880.

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CONTENTS.

Page 1.—Cornice Making.

Page 2.—Cornice Making—(Concluded). Sheet Metal Work. Softening Hard Water.

Page 4.—The Letter Box.

Page 6.—The Letter Box—(Concluded). Wants and Addresses. Stove Trade Notes.

Page 8.—Stove Trade Notes—(Concluded). Filtering the Mississippi Water. Projected Buildings.

Page 9.—Mechanics' Liens.

Page 10.—Impatient Correspondents. The Hammer. A German School for Workers in Sheet Metal.

Page 11.—Water Street, New York.

Page 12.—Trade Report. Failures in 1879. The Edison Electric Light. New Water Supply for New York.

Page 14.—Plumbing.

Page 16.—Plumbing—(Concluded).

Page 18.—Prices Current.

Impatient Correspondents.

Almost every day brings us letters from one or more readers, to the effect that on such a date they mailed us a communication which has not yet appeared in our columns, and asking us to state by return mail whether it was received; and, if so, why it has not been printed. To answer these letters makes a great deal of unnecessary work for the Editor, and he is compelled to ask correspondents not to manifest an unnecessary impatience in the matter. As the rule, we use what comes to us for publication as promptly as possible, if we use it at all. We are not always able to answer inquiries off hand, and have not always room enough to print the letters received each week. The motto of our editorial room is "Do the best you can," and we try to apply this as the rule which governs all our work. We do the best we can for everybody, but it is simply impossible to print, with intelligent answer or comment, every letter which comes to us the same week it is received. We have more than once sent to Montreal or St. Louis for information asked for by some subscriber in Georgia or California, and have often spent precious days in hunting up some point which had been referred to us. In the case of letters relating to sheet metal work, there is often a necessary delay which our correspondents may not understand. The question asked or the drawing sent must be considered, an answer prepared or the rule sent carefully worked out to a demonstration, an engraving made, and if wrong in any point corrected, and then we are ready to print it. We try to give attention to letters as nearly as possible in the order in which they are received, and it is only in summer, when the volume of our correspondence falls off, that we are able to catch up and print each week all the letters we receive. If any one thinks that preparing the department matter for *The Metal Worker* is all fun for the Editor and his assistants, he is a good deal mistaken. In the future, as in the past, we shall "do the best we can," and if correspondents will kindly remember this, they will save themselves and us a great deal of trouble growing out of unnecessary letter writing, which takes much valuable time at this end of the line, though probably not much at the other.

The Hammer.

Of all the tools used in the arts, probably none receives so little attention from the workman as the hammer. Few tools are so generally used which have such a great variety of form and size. The smallest used by the workman in the precious metals has a head of only an ounce or two in weight, while the blacksmith's sledge hammer may have a head weighing 40 pounds. The diversity of shapes seems almost infinite. In the face, or portion which delivers the blow, we have all sorts of variations between the square flat face and that in which the face is represented by a sharp edge only. The planishing hammer may be said to be all face, while the geologist's hammer has no face at all, but only the sharp edge. The round face or ball of the tinman's hammer seems to occupy the middle place between these two extremes. Under the head of hammers we may properly include mallets and all implements which are used in the hands for striking a blow. Perhaps there are no implements of this description more difficult to wield than the long-headed mallets used by calkers. A cylindrical head, not more than 3 inches in diameter and 20 or more inches long, is placed upon the end of a comparatively short handle. It is easy enough to strike a blow with one of these, but to hit the object aimed at is quite another matter.

This leads to the consideration of the amount of skill which almost any workman gains in the use of the hammer. When we stop to consider that there is no such thing as the possibility of taking aim, but that the hand and arm learn by instinct how to direct the handle so that the head may strike the exact spot, we find no little matter for wonder. How difficult a thing this is can only be realized by taking some unusual or awkward form of the hammer in the hand and attempting to strike a blow with it. If one wishes to experiment in this line a little, he has only to try to drive a nail with a shoe hammer, or drive a spike in a railroad tie with the heavy small-faced "mauls" which railroad track hands use for the purpose. It will not take many blows to convince the experimenter that a great deal of skill is needed for so simple a thing as striking a blow with a hammer and hitting the point aimed at.

The first hammers were doubtless stones, held by twisting a withe around them, as blacksmiths do at the present day with their fullering irons. A stone so held is by no means so unhandy a tool as might be supposed, and for driving a stake or breaking a shin bone, it probably answered its purpose very well. Hammers began to take a modern form almost as soon as man was able to fashion them from metal, or we might better say, perhaps, that ancient forms are still retained among the great variety in use at the present day.

In the olden time, before machinery began to supplant hand labor in so many ways, the hammer was the leading tool in use for making all kinds of raised sheet-metal work. And not only was the work made by its use, but in a great many cases beautiful ornaments were also produced almost entirely by hammering. In one of the leading railway shops of France, not many years ago, iron panels for railway carriages were made by the hand hammer. Each had a sunken panel in its center and a molding around it, all done by the hammer. These were smooth, true and free from "pucker." A great deal of copper work is still produced by careful manipulation with the hammer, and the finish which it gives can hardly be surpassed in beauty and utility.

No doubt the introduction of stamping and drawing presses has done a great deal to make skill in the use of the hammer a thing of the past. On some accounts this is to be regretted, for there are many portions of our modern sheet-metal work which could be very greatly improved by the judicious use of the hammer. It is not uncommon to find that country tinsmiths, from the lack of other tools, are in the habit of executing a great deal of work with the hammer which is generally done on machines.

There is perhaps nothing connected with this simple tool so astonishing as its enormous power. A few blows produce as great an effect as hundreds of pounds pressure slowly applied. To those who watch the effects closely there are many interesting points in regard to the character of the blows delivered by different weights of hammer heads. The light head at the end of a long handle delivers a breaking blow, expending itself in driving the metal upon which it falls out of shape. The heavy head, on the other hand, tends to move the work more and batter it less. The light hammer forces the metal out to shape better, while the heavy one is selected to drive home the sticking pin or the wedge which is to lift the heavy weight. Attempts have been made to compute the force of these blows, and show the amount of weight which should be placed upon a spike, for example, in order to force it home in the same manner and time as as could be done with a hammer. The calculations, however, do not seem to be satisfactory, probably because there are no accurate experiments upon which the calculations could be founded. In spite of all machines and improvements, the hammer has and will for many generations remain one of the mechanic's most indispensable and valuable tools.

A German School for Workers in Sheet Metal.

For some centuries, or since the Italian universities declined in usefulness and influence, the various nations of Europe have done what they could to foster universities and establish scientific and technical schools of their own. For the number of its educational institutions of all grades, their excellence and variety, Germany occupies a very high rank, and, owing to peculiar circumstances, the Germans were forced at an early day to give much thought, not alone to higher technical education, but also to the devising of a system of instruction for mechanics. The ancient guilds seriously obstructed industrial progress, and as they could not be remodeled to adapt themselves to altered circumstances, they were abolished, although no provisions were made to perpetuate their valuable features. Masters ceased to take any pride in the shop instruction of their apprentices, whose efficiency in the various departments of their trade was no longer a matter of interest to their employers. The desire to make the work of the apprentice as profitable to themselves as possible was not checked by any obligations imposed by a mutual agreement, and thus the young man, instead of learning all the departments of his trade, became efficient only in some one manipulation, or in the running of one or more special machines. These drawbacks were strikingly apparent in Germany, owing to the rapidity of the change there; and in conformity with a high, and perhaps exaggerated, opinion of the value of schools as a means of instruction, it was to them that both the government and the trades turned. In view of the fact that there has been a very strong agitation on the same subject in this country, it may be of interest to give a brief outline of the plan adopted some time since for the instruction of sheet-metal workers in Germany. As early as 1873, the question of the foundation of such a school was discussed by the Association of Sheet Metal Workers, and in 1875 a committee was appointed to inquire into the matter and secure contributions for its establishment. The cost was ascertained to be so high that it was suggested as an alternative to create the school as a branch of some existing technical institution; but efforts in that direction failed, and the promoters of the enterprise returned to the original project. At this juncture a prominent manufacturer of sheet metal workers' machine tools, Herr E. Kircheis, of Aue, Saxony, offered to equip the school with tools, and with a number of others he succeeded in obtaining a grant of real estate from the city of Aue, and subscriptions amounting to 30,000 marks. To this the Saxon government added a loan of 30,000 marks, without interest, so that it was possible to open the school in 1877.

The course of studies, extending over one year and a-half, is carried out in three terms, the lessons given embracing both theoretical topics and practical exercises. In arithmetic, common and decimal fractions, interest and discounts are taught; while in algebra the pupils learn equations, logarithms, &c. Special care is taken to make them thoroughly acquainted in geometry with the calculation of the areas and contents of bodies, and with the elements of trigonometry and stereometry, which, as our columns abundantly prove, are a necessity to all those engaged in the trade. The scholars at Aue are taught both geometrical and freehand drawing, the laws of projection and of perspective, and the construction of patterns. In the last two terms the elements of architectural styles are given, and drawings of each are made. This is supplemented by a few lectures on the history of art. A somewhat brief course in physics and mechanics initiates the pupils into these sciences, while some time is also devoted to the technology of the most important metals and their alloys. Lessons in the German language are necessarily added, in order to perfect orthography and give a certain facility in composition. A feature which has been very wisely added is a course in bookkeeping, while lessons in modeling supplement the lectures on drawing, &c. All these theoretical studies are so distributed that they take 22, 26 and 30 hours per week in the first, second and third terms respectively. This affords much time for practical work, especially during the first term, the exercises occupying 22, 17 and 12 hours respectively. During the first term the pupils learn how to take apart and put together the machines used for working sheet metal, to make useful articles and to run a lathe. They are taught how to make gutters, pipes and the different kinds of roofing. The second term is devoted to more difficult work; the pupils make geometrical bodies of sheet zinc, fine tinware, lacquered ware and simple brass goods, and finish more complicated work at the lathe and with the hammer. They are instructed in regard to gas and water piping, and make ornaments of sheet zinc. The course for the first class finishes with electro-plating.

The success of the school has thus far been very gratifying, a fact due, probably, to the earnest co-operation of the managers, Herren E. O. Wilhelmy and Kircheis, and the corps of teachers under the directorship of Herr Heinrich Schmidt. The cost of tuition of each term is 112 marks (about $28), while the cost of living is estimated at $15 to $20 per month. We understand that the capital necessary to establish this school has not yet been fully subscribed, but the management are prepared to issue certificates of membership of the School Association. We hope that they will succeed in placing the school, which has now been very well attended for more than two years, upon a permanent basis.

Recent advices from Washington confirm the opinion generally held in business circles, that no important measures affecting the tariff will be reported by the Ways and Means Committee during the present session of Congress. Mr. Wood has said as much, and other members of the committee have stated that they should not favor any interference with the tariff at this time, as anything tending to excite distrust or shake confidence would probably check the industrial development now progressing so satisfactorily. Such unusual solicitude for the business interests of the country on the part of a committee composed mainly of pronounced free traders would naturally excite suspicion, were it not that the party which controls the House has another and more satisfactory reason for letting the tariff alone. On the eve of a Presidential election they are afraid to touch it, not feeling half as sure as they profess to be that they could safely go before the country with a fresh record of acts hostile to American industry. If there was no political reason for conservatism in tariff matters, we should not expect the House or its committees to show much consideration for the business interests of the country. Mr. Wood has already given us one bright and shining illustration of his extreme solicitude for the prosperity of the country by his absurd performances as a tariff tinker two years ago. Probably he has learned something from experience, but it is not that the best interests of production and trade are secured by a consistent and assured protection to home industry. This is something he will never learn.

In our department of "Stove Trade Notes" this week will be found the notice of the meeting of the National Association of Stove Manufacturers. It is probable the meeting will be large and interesting, and that the new departure in the matter of providing an entertainment will be appreciated by the trade.

Water Street, New York.

For the information of visiting members of the National Association of Stove Founders who are next week expected here in large numbers to attend the annual convention of the trade, "Jeems, the Blackener," has prepared the following historical, geographical and biographical sketch of Water street, which we are sure will be read with great interest :

Water street posseses, or at least ought to possess, a great interest for the stove trade throughout the United States. Although only the headquarters of the New York city and local trade at present, it is destined yet to become the head center for the greater part of the trade of the United States. Neither local or sectional rivalries can prevent it. Our trade is destined to many important and radical improvements, and sweeping changes will be made on the methods of doing the stove business in the future. The stove business is in its infancy yet.

It is rather singular that River street is the headquarters of the Troy stove business. It looks as though the trade prefer the fluid names to locate on, which may account for the ease and facility with which they take water on many occasions. Water street has a historical reputation, which will always be associated with the metropolis aside from its interest to us. Stoves and crime have kept close company in New York ; but as virtue is always triumphant, stoves are getting the better of crime, and Water street is being slowly, but surely, freed from the stream of vice that must somewhere find a channel in which to flow through every great city. More stabbing and miscellaneous murdering have been committed on the three blocks of Water street running from Peck Slip to James Slip than in any other part of New York, the Five Points not excepted. But a vast change has come over it, and Water street will soon be as orderly and as respectable as the most fastidious could desire. This change has been brought about by the exertions of a few earnest Christian people, who went down into this lion's den, and, in the middle of the street and in front of one of the worst hells, asked divine assistance, and it was given. The good seed thus planted is bearing fruit. But we will first take a look back at the street in the last century to see how our trade stood then. Its moral and religious aspects will be noticed afterward, following the usual method.

George Youle kept stoves and plumbing goods in Water street, between Dover and Roosevelt, about 1789, and afterward went in the shot business and built a shot tower. When he died he left a large fortune. A man by the name of Sabattin was in partnership with him at one time, and the firm was Youle & Sabattin, at264 Water street. I. Brewsterburgh succeeded them till 1834, when he died. Charles Postly, the father of General Postly, started where Whitfield is, opposite Southard's, about 1790, and was there about 40 years. J. Wilson kept in Water street in 1814. Watson Sanford, of the National Stove Works, worked for him. Mr. Sanford is the oldest Water street stove man living to-day. Hot-air furnaces were made by W. M. Lyle, New York, 1767, but the plate from which this inscription was taken does not say where in New York, but very likely it was in Water street. The senior J. L. Mott was at 233½ Water street at one time. In 1838 he bought the lease of his old stand in Water street from Packard & Starbuck, who had occupied it for several years, for $7000. Here he put up a furnace and made castings. He made the name of Mott's stoves a household word for old New Yorkers. There was a colored man by the name of La Mott who made a pile of money on stoves somewhere in the forties, probably from the similarity of names, but he died poor. When Jordan L. Mott took command of the concern he packed the whole institution off, under the name of the J. L. Mott Iron Works, up to St. George's Building, out of which he is gradually crowding the rest of the occupants until his domain will cover the whole of it, when he will keep just enough goods to carry on the retail trade, and probably start an immese new wholesale house elsewhere. Jordan has just purchased for $100,000 the little house that Dick Connolly built up town, at a cost to Dick of over $300,000 of his hard earnings. Jordan will endeavor to worry out the few remaining years of his life in this modest cottage, always hoping for better things when the business shall be more profitable. His tastes are simple, but he likes to have things nice about him. The J. L. Mott Iron Works are largely looked after by Mr. John Reid, with a splendid corps of lieutenants, among whom will be found the venerable but stalwart Diven, the "lone fisherman" of Water street.

Mr. Utter, the father of "Sleepy Sam," as he calls himself, was in partnership about 1849 with Thomas Southard, under the name of Utter & Southard. Finch was at 231 Water street then. John Liddle, the father of Bob Liddle, occupied this store at one time during those days. Finch's people afterward moved down to 213 Water street. Thomas Southard, father of the present head of Southard, Robertson & Foster, afterward carried on the business at 231 very successfully. Watson Sanford, of the National Stove Works, was clerk for him there, as was also J. Q. A. Butler. He took in Chas. Frost, his nephew, in 1857, making the firm Southard & Co. When Mr. Southard died the firm became Frost & Southard, Southard's son assuming his father's interest. Mr. Frost died, and Mr. Southard admitted his brother-in-law, Mr. G. W. Robertson, and Mr. W. H. Foster, who has grown up in the service of the house, under the name of Southard & Co., since changed to Southard, Robertson & Foster, now on the corner of Peck Slip and Water street. On the spot where their store stands was the old ferry to Brooklyn many years ago.

The Union Stove Works were located for many years in Water street, and under the name of R. R. Finch & Co. Mr. Hill, a son-in-law, was the Co. After the death of the elder Finch, the firm became R. R. Finch's Sons, his sons taking the business, under the management in New York of R. R. Finch, Jr., and at Peekskill of Mr. Hill. It was again changed and formed into a stock company under its present title, and Mr. P. B. Acker, a son-in-law also,. was made treasurer. They moved from Water street up to St. George's Building, and from thence to their present location in Beekman street.

Whitney & Brown owned the National Stove Works about 1850, and occupied the old stores where Abendroth's place now is. The firm afterward became Whitney & Montanya. Montanya went to San Francisco among the pioneers, made a pile of money and is still sticking to the business. Wash. Whitney was a very successful man at one time. He owned half of Lovejoy's Hotel—a big place then ; was one of the founders of the Park Bank, built Laura Keene's Theater, and was generally very lucky in all his operations. Watson Sanford went into the concern afterward, and James L. Seabury, the firm standing as Whitney & Sanford and Whitney, Sanford & Co. Then Whitney went out and Mr. John Truslow was admitted, and the firm became Sanford, Truslow & Co. It was afterward turned into a stock company, known as the National Stove Works, and has since been changed to the National Stove and Furnace Works. Mr. Sanford was always a very charitable man, and gave largely in his prosperity to mission work.

Munsell & Thompson started the old McGregor store in New York, and afterward ran the Stewart store. When they gave that up they bought the Crescent Foundry in 1858, and also had a store in Troy. They subsequently moved to Elizabethport and built a fine new foundry. All the old partners are dead except Boss Thompson, who is getting close to fourscore, but is as jolly as ever, and carries on the business with Mr. Cronk, formerly of the Mott Iron Works, under the corporate name of the Munsell & Thompson Manufacturing Company, at the same old store, 215 Water street.

William Abendroth kept a stove store on the Bowery, near Grand street, in the forties, but afterward came down to Water street and went into partnership with Rolhaus, under the name of Rolhaus & Abendroth, at No. 243. Since then other members of the family have been admitted, and Abenbroth Brothers will probably be the name of the house for generations to come. They occupied the old tumble-down shanties that stood on their present site, and afterward tore them down and built the fine warehouse they are now in. Mr. John Frasier, a brother-in-law, is the right-hand man at the store, and fills the position "to a T."

It is very odd how close the stove trade sticks to Water street and vicinity. They have tried to get out of it several times, but have not succeeded. Broadway has been tried, but it was no go, and they all wandered back. John Liddle had a splendid store on Broadway, and so did Richardson & Boynton at one time. They succeeded Johnson, Cox & Fuller in the Gibson Building, or Gallery of Decorative Art as it was called. They have been very successful in accumulating both large fortunes and large families, and there is enough of both to hand down the firm's name for many generations yet. They have two stores at 232 and 234 Water street, with a sign big enough for anyone to read, whether he runs or walks. It is rather remarkable how long and successful these houses have kept the field, one only coming to grief in so many years, and that had been extraordinarly prosperous until internal dissensions divided it against itself. Oliver Van Every, the caboose man, has been on the street since 1834. He and Packard, of Packard & Co., now in South street, are the oldest caboose men in the city. Charley Guinand, the veteran stove blacksmith, has also been around this neighborhood since 1830. Charley is as frisky as a boy yet, and a shining light in the temperance cause.

Charley Shepard, now dead, was one of the eccentric characters of the street. He was a bachelor, with plenty of money, and nothing pleased him more than to get hold of a good joke or a bit of stove-trade scandal, and pour it out to the first fellow he could button-hole. His store is a museum of old relics, and if he were alive to-day he could ante-date the anti-clinkers with stories of what he knew or had seen.

Charley Goodwin and Nick Cort were formerly in the stove business where John Derundeou now is, under the name of Goodwin & Cort ; but they took up the metal business, and it increased on their hands so fast that they gave up stoves to Josh Cort and his father, while they went largely into metals. Goodwin has since died and left a handsome fortune. Nick Cort accumulated another, and this fall has scooped still another. Josh Cort keeps where John Liddle was at one time, and is the agent of the Stamford Foundry Company. His brother, W. K. Cort, has recently started at 250 Water street as the agent of the Co-operative Works of Troy. Ely & Ramsay, Nos. 249 and 251, are a young firm engaged in the manufacturing business, and are growing very rapidly, as is also Mr. G. G. Hallett, who is also the New York agent for Fuller, Warren & Co. The Barstow Stove Works have two stores at the corner of Water and Beekman streets, under the charge of Mr. Hotchkiss. These goods were sold on that spot for many years by T. Merrifield, now dead. George Starritt, a very large jobber and agent of the Richmond Stove Works, has the opposite corner, using both stores. S. W. Gibbs & Co. and Gibbs, Burke & Co. are succeeded by Burke & Conway, at 206 Water street, where the genial and jovial Paul Burke can be found.

Uzal Cory and Graff & Co. are furnacemen. Augustus Butler, Rolhaus, John Derundeou, Oliver Van Every, the Thatcher Heating Company and J. N. Thatcher occupy the remaining stove stores. M. L. Filley, of Troy, has a house here also. Bramhall, Deane & Co., largely engaged in hotel ranges, are the farthest up Water street, and were the last house on Broadway, having only returned to Water street lately.

Perry & Co. have a warehouse on Beekman street, and, in addition to the other houses on the same street, J. Q. A. Butler, Sam Utter, James R. Mangles and H. W. Metcalf are carrying on the business there. The denizens of Water street are known as "Swamp angels," and the location as "the swamp." Beekman streeters are aristocrats and Murray Hillers, but, angels or aristocrats, they look mighty sharp after one another, and a man is gone through pretty thoroughly in each locality to find out what they told him in the other street.

Errors and omissions have occurred probably in this resumé, but they can be corrected, and many a man is living to-day who dwelt and worked in Water street in the prehistoric times who could contribute something toward fixing its history.

Now for the other part. The name of Water street became so infamous that it was not more tolerable than Sodom and Gomorrah, and an effort was made to reform it. The Five Points had been renovated and cleaned out, and the same spirit was to be extended to Water street. Who commenced the crusade I do not know, but they deserve honor, whoever they may be. Johnny Allen's shebang was made the objective about 1867, and in a short time his brothel was turned into a house of prayer. Streams of well-dressed people could be seen pouring into Water street in the middle of the day to attend the noonday prayer meetings. Johnny became converted, and was heralded as the "wickedest man in New York." He might have been, but John was a remarkable man. Aside from his business he was a good-hearted man, very intelligent and well read, with a large knowledge of human nature. Other meetings sprang up. Kit Burns' rat pit was secured at 273 Water street, and the fame of these meetings spread over the whole country. There was a vast difference between Kit Burns and Allen, mentally and physically. Burns was a rough of the lowest order, and his mug indicated it. From this time Water street vice declined, and slowly but surely the religious element has got possession of the worst portion of it (although they have got to get the stove end yet). On the same side with Southard's, and between it and Dover street, is "The Water Street Mission," as the sign says. This is the spot where the famous Kit Burns kept his rat pit. Next door to the mission is a Water street bagnio. If the true history of the proprietors of this place was published, it would be found a remarkable incident in Water street life. Suffice it to say they have grown daughters whose manner and bearing are those of irreproachable young ladies, and no doubt they are, although reared in that tainted atmosphere. No one who should see them in their carriage on the road would suspect that Water street was their home.

When the services are going on during the evening in the mission, in the mild season, with the doors open, the click of the dice can be heard from the next hell as they throw them for the poison which is sold behind the bar. It is a satanic zylophonic accompaniment to the sacred music with which the services are interspersed. "Three sixes!" "There is a fountain filled with blood," is what I heard one evening as I sat by the door. But the mission songs must fill that bagnio from cellar to roof during the services.

On the corner of Water and Dover streets is the Siloam Faith Mission. The front is decorated with four swing wooden signs, inscribed with scriptural quotations, and one, running the whole length of the building, has painted on it : "Holiness becometh thine house, O Lord, forever." Four large lamps light up the place in front quite cheerfully, literally letting their "light so shine" that the poor creatures opposite can see the good works within. The next block above, between Dover and Roosevelt streets, on the left hand side, contains the McAuley Water Street Mission, as the sign says, with only one lamp. On this block, near McAuley's, was started the first great Water street revival mission at Johnny Allen's house, since torn down. Opposite McAuley's, at 305, is Michael Dunn's House of Industry. How or what supports these institutions I know not. I never heard that their neighbors, the stovemen, paid their expenses ; still, they may do so, as they never tell one hand what good the other hand has done. But the anxiety to secure souls is as great in this part of the street as it is in the other to get customers. The missions have not put up the date as yet when they were established, but some one must own the claim for the only original Water street mission. Very thrilling experiences are given in these places, coming as they do generally from the hard-fisted crowd there gathered—a living testimony to the good that the workers in this cause have done. I saw a young man get up in McAuley's one night and relate "how he used to loaf and commit all sorts of crime around the ward ; how Jerry got him to come in, and he thought he would, just to see if he couldn't strike a 'lush'—in short, if he couldn't beat them," and so on. He related each incident very pathetically regarding his conversion, and how he was so happy—and the tears poured down his cheeks—because he came to Jerry's Mission, and his every look and word carried conviction of the truth of his statement. A stout old Irishwoman got up, and after hitching her shawl around her shoulders, arranging her hood and getting a good hold of her pocket handkerchief, she said : "Thanks be to the goodness of God, that I am here this blissid night. God be praised, but if yees cud have seen me three year ago, sitting out furninst that dure, dhrunk—dhrunk indade, I niver was sober a day. There I sat until Jerry coaxed me in, and I give up the dhrink." Here she commenced to cry, and broke down completely, because of her thankfulness. She was one of those women who haunt the fish market on South street for empty fish boxes, and sell them for bucket-shop rum. They can be seen daily lugging big boxes along Water street. Sometimes they stop to rest in front of a stove store, and immediately the whole store is emptied of clerks, blackers, customers, to club the poor fish-box woman off the stoop. The perfume from an old fish box is too powerful to suit the delicate nostrils of the Water street brigade. I heard a Swedish sailor at the Siloam Mission get up and ask prayers for his Cap'n. "You see, brothers, ven ve firsd sail vid dis cap'n, ve had some fellers who lofed der Lord, and efery night ve vas always hafing a goot song, or a goot prayer, and de Cap'n he see ve vas a goot deal better den vat he vas," and he very patronisingly described how the Cap'n hung around till they took him in. The Cap'n had promised to come up to the meeting that night with him, but he had some business and couldn't come, but would come next time, and he wanted "a good prayer for the Cap'n."

The people of the Fourth and Sixth wards have always had a hard reputation, yet there are many dirty-looking specimens of humanity there whose little deeds of kindness and generous actions toward their fellow creatures would shame many of their cultured betters. You cannot always judge the element that comes from this part of New York. They look bad on the surface, and but few ever know or find out any of their good points, but are always ready to blazon to the world their bad ones, magnified beyond recognition. I could relate many other incidents pertaining to this crowd, but refrain for fear the reader will find it tiresome. It is always a difficult matter for an outsider to pass judgment on a clergyman ; but perhaps if the distinguished gentleman who so ably (?) and vividly described the dark side of New York had devoted the same time to telling of all the good things in it, such as the work of these Water-street missions, and hundreds of other human refineries that are located in the highways and byways, and which can be found out without the aid of detectives, a large impulse might have been given many to aid and help them—at least they would have received an advertisement which would have perpetuated their fame equal to their competitors in vice for the great human grist. No one in a long time has advertised New York vice better than that clergyman.

JEEMS.

During the year 1879 the pumping engine at the Danvers (Mass.) Water Works has been run on 17 days, pumping 118,616,696 gallons of water ; 317,634 pounds of coal were used in starting fires and pumping, and 22,469 for banking fires, making a total consumption of 340,113 pounds. In September the water was drawn from the reservoir and a thorough cleaning given. The town was supplied during this time by pumping direct, the pumps running slowly day and night.

The man who hires a plumber should always expect to pay the piper.

Trade Report

Office of THE METAL WORKER,
SATURDAY MORNING, January 31, 1880.

Antimony.—The scarcity in England and here continues, and what there remains of available stock is bringing extreme rates, within the range of 19½¢ @ 23¢, the latter being paid for the "Cookson" brand, and 20¢ for "Hallett."

Coal.—The present state of the trade is anything but encouraging to dealers, operators and Coal mining companies. Little or no Coal can be disposed of, even when the circular rates are heavily shaded. Dealers all over the country seem to have an abundance of Coal; their stocks, in fact, are large, and were mostly put in when prices ruled lower than at present. The warm weather too has prevented them from working off these stocks. Manufacturers have, in most cases, good stocks, and are not in the market. The result of this is that the Coal coming to tide-water is accumulating at the shipping points.

Prices are very low. Nominally the circulars are strictly adhered to by the companies, but it appears that the largest proportion of the Coal that is moved at the present time is sold at large concessions. One of the leading dealers thinks that any smart buyer could get cargoes of Coal at the following prices for free-burning Coal: Lump, Steam, Broken and Egg, $2.65; Stove, $2.90; and Chestnut, $2.80, f. o. b. If a large quantity was wanted, even these figures could be shaded, in his opinion. Whether these figures are accurate it is hard to say, but that the circular rates are shaded is well known. Nominally prices are the same as last week. The line trade is generally very brisk. Freights are nominal, as no Coal is being moved.

Copper.—The market during the week has been quiet, but firm, with sales of 200,000 to 300,000 lbs. Lake Superior at 24¾¢ @ 25¢ to consumers, which is also the closing figure. Baltimore may be nominally quoted as much. The English market has continued to tend upward, the cable reporting Best Selected, £81, and Chili Bars, $75, with rumors of a further advance. Manufactures have been advanced to the following figures: Braziers' Copper, 34¢; Bolts, 34¢; Circles, 37¢, and Sheathing Copper, 32¢.

Hardware.—The condition of the market is much the same as at our last writing. The tendency toward higher prices is still manifest.

Sad Irons have been advanced by the principal makers to 4¼ cents per pound, net.

Zucker & Levett, manufacturers and importers of Polishing Materials and Nickel Platers' supplies, have removed from Nos. 639 and 641 West Fifty-first street, to more commodious quarters at Nos. 540 to 544 West Sixteenth street. They have fitted up their new premises with new and valuable machinery, and are now in a position to fill orders promptly.

Peck Bros. & Co., The Hayden Co., and Landers, Frary & Clark, have advanced the price of Brass Cocks to discount 25 and 10 per cent. from revised price list of January 2, 1880.

R. Armiger & Son, Baltimore, Md., have issued an Illustrated catalogue, in which they present the different styles of "Climax" and Chest Refrigerators manufactured by them. Their "Climax" Upright Refrigerators are made in ten different sizes, and are provided with water-tank, entirely removed from the food chamber. Of Chest Refrigerators, they make six sizes. These are lined with galvanized iron, and are grained in oak, with walnut panels.

Under date of the 26th instant, Oliver Ames & Sons' Corporation announce some sharp advances in their prices of Shovels and Spades. They have advanced the prices of the following goods on their price list of January 1, 1879:

Nos. 522 to 560	per doz.	$0.50
Nos. 598 to 702	" ..	.50
Nos. 112 to 194	" ..	.75
Nos. 561 to 572	" ..	.75
Nos. 838 to 865	" ..	.75
Nos. 723 to 816	" ..	1.25

In their circular they say: "On and after this date (January 26, 1880) we shall allow on all of our goods a discount of 10 per cent. from list prices.

The Table Cutlery manufacturers have again advanced their prices as follows: Fifty cents per gross on all Scale Tang and Solid Wood Handle Tables, 25 @ 50 cents per dozen on Butcher Knives.

Iron.—The only change to notice in the market this week, compared with last, is that the business has assumed a more quiet air, and there is less inclination to purchase for forward delivery than was the case before Iron reached the high figures which it commands to-day. As regards the question of values there is no change to report, and the market is a strong one at current quotations. We see no disposition to force sales, and indeed there are few makers whose Iron is known in this market who could fill an order unless the time of delivery was placed pretty far ahead. We hear of sales of 1000 tons Chestnut Hill No. 2 Gray Forge at $40, delivered at Pittsburgh, equivalent to $37 at furnace; also 1000 tons Thomas Gray Forge at $37.50 at Hoboken; 400 tons No. 1 X (a Lehigh brand), part at $40 and $41; 200 tons Gray Forge at $38 at tide-water, and 100 tons No. 2 X at $39. We learn by wire to-day that the price of Lake Superior Ore for next season's delivery has been fixed at $12 and $12.50 at Cleveland. A meeting of the Iron Association is called for Friday next at Pittsburgh, Pa. We quote: Foundry No. 1, $40 @ $41; Foundry No. 2, $38 @ $39; Gray Forge, $37 @ $38. The Price of Scotch Iron has, we are informed by cable, receded a trifle from the high figures ruling a week ago, but this decline is said to be counterbalanced by an advance in ocean freights. The arrivals of Pig Iron during the week were trifling, something less than 400 tons all told. Sales during the same period have, so far as we can learn, been confined within small limits, no transaction of much magnitude being reported. We hear of sales of 100 tons Eglinton at $32.50; 100 tons Gartsherrie at $34, and 100 tons Summerlee at $34.50. We quote the market firm at the following figures: Eglinton, $33; Coltness, $36; Glengarnock, $34 @ $35; and Gartsherrie, $33 @ $34. The arrivals of Scrap Iron during the week aggregate about 3700 tons. The only sale worthy of mention that has come to our notice is a lot of 500 tons, Western delivery, on private terms. We quote No. 1 Wrought from yard, $43 @ $45. The demand for Bars and Sheets is active for the season, and the foreign markets continue to be drawn upon to supply a demand for which our own manufacturers were unprepared. The number of Bars delivered at this port for the week ending January 27 is 38,282, and some importers say they are unable to get their orders filled as fast as they would wish. The Bar Iron Association of this city held a meeting since we last went to press, at which the base price of Refined Bar from store was advanced to 3.8¢.

Lead.—Common Domestic Lead remains quite firm; a sale of Newark of some 400 tons is spoken of as having been effected at 6.10¢; at all events, no Lead can be had at 6¢, 6⅛¢ being in some cases insisted upon. The quotation for Refined is 6.35¢ @ 6⅜¢, at which some sales have been made. Manufacturers' prices are unchanged. We quote: Bar, 6½¢; Pipe, 7¾¢; Sheet, 8½¢; Tin-lined Pipe, 15¢, all less 10 % to the trade. No. 1 Solder, 13¢.

Nails.—The demand for Nails isnot active, but at the same time there is little pressure to sell on the part of holders, as stocks are unusually light, and in many instances assortments are badly broken. We quote 10d. to 60d., $5.15 @ $5.25, net, according to size of order.

Nickel—Is in steady request at $1.40 for Prime Domestic.

Old Metals, Paper Stock, &c.—The Old Metal market is very active this week, and we note an upward tendency in prices. Business in the Rag and Paper Stock market is also very brisk, and the demand is reported as being better than it has been for a long time.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy	per lb.	$0.19	@	.20
Copper Bottoms	"	.15½	@	.16½
Yellow Metal	℔ lb	.10	@	.11
Brass, heavy	"	.12	@	.13
Brass, light	"	.08½	@	.09½
Composition, heavy	"	.15	@	.16
Lead, heavy	"	.04¼	@	.04¾
Tea Lead	"	.04	@	.04½
Zinc	"	.03½	@	.04
Pewter, No. 1	"	.12	@	.13
Pewter, No. 2	"	.07	@	.08
Wrought Iron	per ton	32.50	@	35.00
Light do	"	20.00	@	22.50
Stove Plate	"	15.00	@	17.00
Machinery do	"	20.00	@	22.50
Grate Bars	"	7.50	@	10.00

The prices current for Rags, &c., are as follows:

Canvas, Linen	per lb.	3½c. @ 4 c.
White Cotton, New	"	4½c. @ ....
" No. 2	"	2½c. @ 3 c.
White, No. 1	"	5½c. @ ....
No. 2	"	3 c. @ 3½c.
Seconds	℔ lb.	2 c. @ 2¼c.
Mixed, Woolen	"	2 c. @ 3 c.
Soft, do	"	16 c. @ 17 c.
Mixed Rags	"	2 c. @ 3 c.
Gunny bagging	"	3 c. @ ....
Jute butts	"	2¾c. @ ....
Kentucky bagging	"	2 c. @ 3 c.
Book Stock	℔ lb.	3 c. @ ....
Newspapers	"	2 c. @ ....
Waste Paper and Scraps	"	¾c. @ ...
Kentucky Bale Rope	"	4 c. @ ....

Plumbers' Materials.—We print below a revised price list of Wrought Iron Pipe, adopted by the manufacturers on Wednesday next. Edward Barr, No. 78 John street, agent for W. C. Allison & Co., quotes discount 35 per cent. from the new list:

JANUARY 28, 1880.

To Take the Place of all Previous Lists.

REVISED PRICE LIST OF WROUGHT IRON PIPE FOR STEAM, GAS AND WATER.

Inside Diameter. Inches.	Wrought Iron Pipe. Per Foot.	Galvanized Rubber Coated or Enameled. Per Foot.	Weight of Pipe. Per Foot.
⅛	$0.08	.....	.24
¼	.08	$0.11	.42
⅜	.09	.12	.56
½	.10½	.15	.85
¾	.12½	.19	1.12
1	.19	.28	1.67
1¼	.27	.40	2.25
1½	.33	.47	2.69
2	.46	.64	3.66
2½	.75	1.00	5.77
3	.95	1.30	7.54
3½	1.25	1.70	9.05
4	1.50	2.05	10.72
4½	1.75	2.40	12.49
5	2.25	3.00	14.56
6	2.75	4.00	18.77
7	3.75	....	23.00
8	4.75	....	28.00
9	6.25	....	.....
10	8.00	....	.....
12	12.00	....	.....

Discount from the above list 35 per cent. Discounts subject to change without notice.

Spelter and Zinc.—There has been a moderate amount of business done in Common Domestic Spelter at 6⅝¢ @ 6¾¢, the latter figure having been paid for Missouri. Of Silesian some 100 tons have changed hands at 6¾¢ @ 6⅞¢, which is the quotation at the close, as to brand. We quote *Sheet Zinc*, 8¼¢ @ 9¢.

Tin.—The market is firm, with a fair demand. We quote: Banca, 28¢; Straits, 26¢, and English, 25¢. There is considerable activity in Tin Plates at the following figures: I. C. Charcoal, $10 @ $10.50; I. C. Coke, $9.50; Charcoal Terne, $9.25 @ $9.50, and Coke Terne, $8.75.

Failures in 1879.

Messrs. Dun, Barlow & Co.'s Mercantile Agency have just published their usual annual statement of the failures during the year 1879. From this compilation it appears that last year there were 6658 failures, as against 10,478 in 1878, or a decrease of 3820. While this is a remarkable showing of itself, it is in the amount of liabilities that the decrease is most marked. This amount in 1879 was $98,149,052, as against $234,381,132 in 1878, or a decrease of $136,234,080. The following table gives the number of failures and liabilities since 1872:

Year.	Failures.	Amount of Liabilities.
1872	4,069	$121,056,000
1873	5,183	228,499,900
1874	5,830	155,239,000
1875	7,740	201,000,000
1876	9,092	191,117,000
1877	8,872	190,669,936
1878	10,478	234,383,132
1879	6,658	98,149,052

The geographical distribution of these failures and the percentage in each locality afford figures from which interesting comparisons may be made. The figures for 1879 show that in the Western States only one trader in every 159 failed; in the Middle States, one in every 100; in the Southern States, one in every 93; in the Eastern States, one in every 85; and on the Pacific slope, one in every 45. These percentages are worth studying, as indicating more clearly than anything else, perhaps, the locality in which the chances of a business man meeting with success are the greatest, as well as the section in which the condition of trade has most rapidly improved. The following table in this connection will prove of interest:

States.	Number in business.	1879. Number of failures.	Percentage of failures.	Amount of liabilities.	Average liabilities.
Eastern	82,332	970	1 in 85	$15,577,282	$16,059
Middle	230,537	2,290	1 in 100	35,534,191	15,517
Southern	100,574	1,076	1 in 93	15,876,703	14,755
Western	256,583	1,608	1 in 159	21,207,519	18,188
Pacific and Ter	32,126	714	1 in 45	9,953,358	13,940
Total U. S.	702,157	6,658	1 in 105	$98,149,053	$14,741
Canada	55,964	1,902	1 in 29	$29,347,937	$15,430

As compared with those of 1878, the figures clearly illustrate the uniformity of the improvement in the Eastern, Middle and Southern States, while the gain apparent in the Western States is at once so marked as to indicate a great stride in commercial solidity in that section. The foregoing figures, Dun, Barlow & Co.'s circular says, convey a better idea than any other of the real decrease in the number of failures, apart from the amount of the indebtednes. The difference in the aggregate between 6658 in number in 1879, as compared with 10,478 in 1878, seems much greater when it is realized that in 1879 only one trader in every 105 failed, as against one in every 64 in 1878. Extending the comparison back over some years, these are the results:

In 1876 every sixty-ninth man succumbed; in 1877, every seventy-third; in 1878, every sixty-fourth, while in 1879 only one in every one hundred and fifth trader failed. In an army of over 700,000 traders an improvement so marked would certainly beget a most hopeful confidence in its chances of success. A still further comparison of the foregoing figures gives emphasis to the marvelous improvement in the United States over the condition of affairs in Canada, although in the Dominion the signs of better times are unmistakable.

The number of failures in each quarter of the last four years may serve as a guide in determining whether failures are more apt to occurr in any one season of the year than in another. They are as follows:

	First quar.	Second quar.	Third quar.	Fourth quar.
1876	2806	1794	2450	2042
1877	2869	1880	1816	2307
1878	3355	2470	2853	1800
1879	2524	1534	1262	1338

After surveying the commercial horizon, the firm of Dun, Barlow & Co. say: "A fear has been felt by some that the activity in trade, and especially the advance in values, could not be maintained, and that the improvement in business generally was not of sufficiently gradual growth to be lasting. But as the months go by, the sings of reaction seem less and less marked. Speculation, it is true, has been indulged in as regards numerous articles, and at one time bid fair to become destructive; but it was not allowed to go far enough to seriously increase production, or to disturb domestic or foreign trade, and the year closed with numerous encouraging signs of steadiness in extent and character of trade, and also a firmness in prices which are consistent only with a healthy demand. The bank returns from the clearing-houses of 22 leading cities through which the banks settle their balances, indicate that the volume of trade for December was larger by nearly 50 per cent. than for the same month in 1878, and the percentage of increased business over the year 1878 was even greater in that month than for any other month in the year. Considering the activity of the preceding three months, and the fact that speculative operations were largely restricted, the showing for the last month of the year is significant. The ability of the country to buy and pay for all the merchandise manufactured and imported need not be doubted in the face of its productive power, and what it has to sell, as indicatad by the increased volume and variety of its exports.

The Edison Electric Light.—It would seem from the accounts in the papers and the statements made by Mr. Edison that there is a discrepancy which must be accounted for in some way. A short time since from 40 to 50 electric lights were reported in operation at Menlo Park. Three dynamo-electric machines were supplying electricity to them, and at the time of which we speak the 80-horse engine was only driving one or two lathes in addition to the electric machines. Mr. Edison's statement was to the effect that the machines required about 5-horse-power each, or a total of 14 or 15 horse-power for the 40 lights. Mr. Edison also said that he thought the lights would average about 16 candle-power each. From all that could be seen eight-candle-power would be a much more accurate estimate of the lights, some of which fall considerably below this figure. In the matter of horse-power we think Mr. Edison was greatly mistaken. It is to be noted that admittance to both engine and boiler room was denied. The pump which fed the boiler was running at the rate of 36 strokes per minute. As it was a regular pattern boiler feed pump it was easy to ascertain the size and capacity, and a very small amount of calculation showed that the quantity of water used by the boiler was sufficient to furnish steam to an engine developing considerably more than 100 horse-power. From this it will be seen that instead of getting three lights per horse-power, as appeared, or from eight to ten of these lights per horse-power, as was stated, each light requires two horse-power or more. The light evidently has not been working in an entirely satisfactory manner, and it is probable that much more experimenting will be needed before it will be ready for public introduction. That a success in many directions is certain no one will deny, and even at a cost of one horse-power per light the expense need not be so serious as to form an objection to the use of electricity. Though it would be more costly than kerosene, it would probably be much cheaper than gas at the present rates.

New Water Supply for New York.—The *Evening Telegram* of the 13th gives in full the scheme for an additional water supply for this city, to be drawn from the streams of Westchester County. Three millions of dollars are to be expended in getting an additional 20,000,000 of gallons per day. It is stated that work will very soon commence, as the surveys have been completed. After the water is got, what can be done with it? New York has a greater water supply now than she knows what to do with. The great trouble is to get to the city. Until the aqueduct is enlarged, or another one built, there will be no advantage to be gained by increasing the supply in ponds and storage reservoirs.

Soapstone wash basins sinks and other articles of a similar character are growing quite rapidly in favor in this city. Their cost is only about 30 per cent. more than wooden articles of the same kind, and they have many advantages. They do not warp, smell nor shrink under the action of water or dry weather. When not in use they require no attention, and have the additional advantage of being more absorbent. This is of especial advantage for wash trays. Mr. J. H. Serene, 310 Pearl street, New York, is making sinks, tanks and wash trays from soapstone, besides solid soapstone registers. Many of the best houses in the city are using soapstone wash trays.

The property of the Citizens' Gas Company, of Indianapolis, was sold on the 10th, on an execution in favor of the firm who furnished the pipe for the mains, for $21,164.40.

BRANDS OF TIN PLATE.

BRIGHT.

Cookley K, MF, Pontymister, Talbot, Melyn, P. S. & Co., Killey, Allaway, P M. Machen, Siluria, Old Castle, Ystitty, and many others equally well known.

MAKERS' BRANDS ONLY.

ROOFING.

MF, Pontymister, Talbot, Melyn, Osierbed, Worcester, S T P, Garth, Allaway, Dean, Ynis, D R D, M. & J., Old Castle, and many others equally well known.

We do not import any Tin Plates **under Private Brands.** Those desiring well known and reliable grades can have their orders filled promptly.

MERCHANT & CO.,
PHILADELPHIA.

All Goods Guaranteed as Represented.

Choice Brands Bright Tin.

"EXCELLENT." Sole importer of this brand. Superior to Melyn or Talbot, and at less price. Try it.

"REGENT." Extra fine quality Packed with tissue paper. This is undoubtedly the best plate ever imported into the American market.

ROOFING PLATES of every brand and quality, including M. F. 14x20 and 20x28, at very low figures.

"PEERLESS" Solder, specially fine quality.

RUSSIA IRON at very low figures.

PHILADELPHIA SHEET IRON at very low figures.

MICA at very low figures.

ELBOWS at very low figures.

PIG TIN at very low figures.

Stamped Ware, Wire, Rivets, Sheet Zinc, &c.

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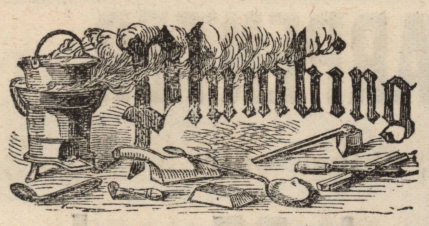
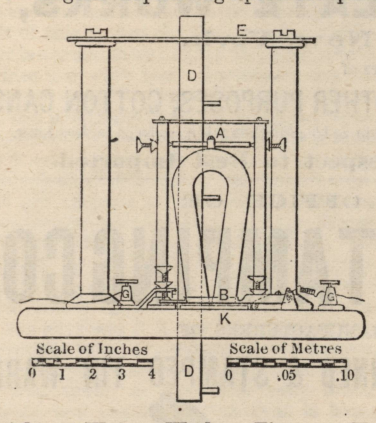


Brighton High Service.—Temporary Water Supply.

The town of Brighton, Mass., has a temporary high-service water supply, which is of especial interest because it illustrates what may be done in a small, cheap way to give a town both water and fire protection. This service was recently described and illustrated in a paper read by Mr. Dexter Brackett, of the Boston Water Works, before the Boston Society of Civil Engineers.

The works, which were built in 1876 to supply the higher portions of the Brighton District, Boston, are worthy of notice, not on account of their magnitude, but on account of some details of construction.

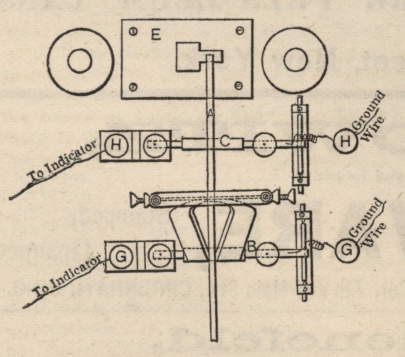
The pumping machinery consists of two Worthington duplex high-pressure pumps,



Brighton Water Works.—Fig. 1.—Hall's Electrical Indicator.—Apparatus at the Reservoir, showing the Magnet by which the Recording Motion is Reversed.

each having a capacity of 250,000 gallons in 24 hours. This rate can be doubled in case of emergency. The reservoir, or tank, situated about a mile distant from the pumping station, is about 29 feet square, and has a capacity of about 40,000 gallons. Its foundation is concrete, resting upon rock and hard pan. The side walls are 10 feet high, 5 feet thick at bottom, 2 feet thick at top, built of rubblestone laid in cement. The sides and bottom of the reservoir are lined with a 4-inch course of brickwork, which is covered with a thin coating of Portland cement. This coating was added after the completion of the reservoir, as without it there was found to be a slight leakage. The reservoir is almost entirely above the level of the surrounding ground, and the only precaution taken to prevent the freezing of the water was by forming an air space between the wooden roof, with which it is covered, and sheathing on the under side of timbers placed across the reservoir at the top of the side walls. This has been effectual.

A reservoir of this size will hold water enough to supply a town of a very respectable size for 24 hours. In a place where water meters are used by all consumers, 40,000 gallons would be ample for 1600 for a week day, and would be a sufficient night supply for 4000 or 5000. This quantity is, however, rather small for Brighton, and on this account it is absolutely essential that the engineer at the pumping station should at all times be informed as to the depth of the water in the reservoir, and as the high service supply is drawn from the force main between the engine house and the reservoir,



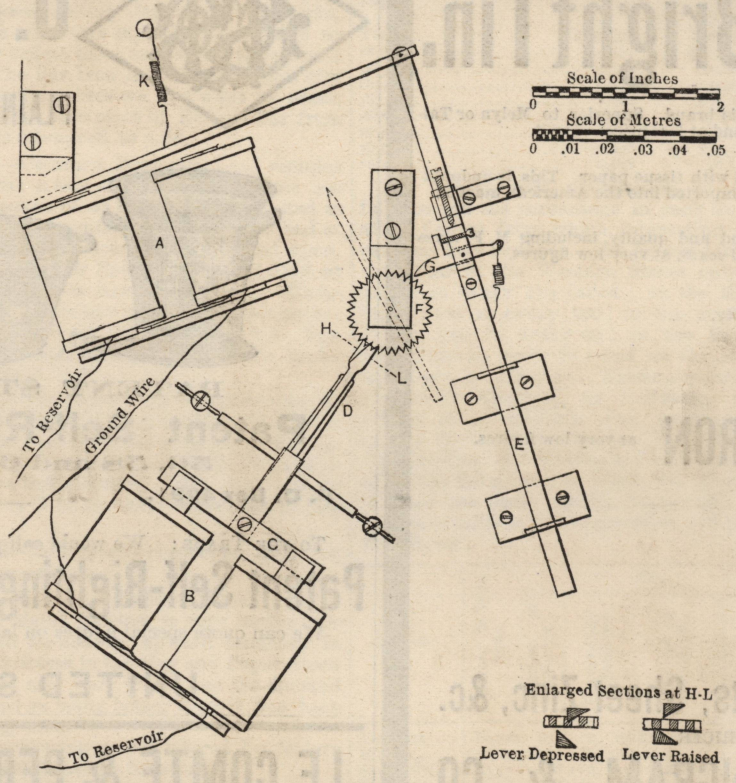
Brighton Water Works.—Fig. 2.—Hall's Electrical Indicator.—Top view of the Apparatus at the Reservoir.

a pressure gauge attached to the force main could not be used for this purpose.

This result has, however, been attained by means of an electric indicator, designed and patented by Thos. Hall, an electrician of this city. It consists of an apparatus at the reservoir, and an indicator at the engine house, which shows at all times the hight of the water in the reservoir. The apparatus at the reservoir, shown in Figs. 1 and 2, consists of a horseshoe magnet attached at right angles to the bar A, and free to swing between the armatures B and C. A vertical brass rod D, having projecting pins placed 3 inches apart, passes through the guides E E, and is upheld by a copper ball float placed in the reservoir.

When the water falls, the projecting pins upon the rod D strike the bar A, and the magnet is swung over the armature B, as shown in Fig. 2. The attraction of the magnet raises the armature from the position shown in Fig. 1, against the point F, and thus closes the circuit through the cups G G.

The water continuing to fall, the bar A is released, the magnet falls back to a perpendicular position, and the circuit is broken. The water rising swings the magnet in the opposite direction over the armature C, which, being attracted, closes another circuit through the cups H H. When the magnet is released, it is prevented from swinging over the opposite armature by the attraction of the iron bar K, which is placed midway between the two armatures. At the engine-house is the indicator, a rear view of which is shown in Fig. 3. It consists of two electro-magnets, A and B, which, by means of the armatures C C, armature lever D, and slide E, revolve in either direction the toothed wheel F, to the spindle of which is attached the indicating hand. When the circuit is closed at the reservoir by the falling of the water surface, the armature is drawn against the electro-magnet A, throwing the latch G against a tooth of the wheel F, thus moving the wheel and indicating by the hand on the dial a fall of 3 inches at the reservoir; when the circuit is broken, the armature, being released, is drawn up by the spring K into the position shown in the figure. When the water rises the wheel is moved in the opposite direction by means of the armature



Brighton Water Works.—Fig. 3.—Hall's Electrical Indicator.—Apparatus at the Engine House for showing Hight of Water at the Reservoir.

lever D. The end of this lever is toothed, the faces of the teeth being inclined planes, as shown by the enlarged sections on Fig. 3. The armature lever D also acts as a ratchet to hold the wheel F in position. The indicator has now been in constant use for three years, and has given complete satisfaction.

When the works were built the reservoir was not located at as high an elevation as was desired, but as it was supposed that the works would be abandoned within four or five years, it was not deemed advisable to purchase land for the reservoir at a greater elevation. On account of the inefficient supply caused by the low grade of the reservoir, and the probability that the works would be maintained for some years, an experiment was tried the past summer for the purpose of furnishing a supply for the buildings above the level of the reservoir.

The experiment, which has been entirely successful, consisted in the introduction of a check valve, with a safety-valve by-pass on the force main, which is also the supply main, just outside of the reservoir. This check valve consists of a cast-iron chamber containing a flap valve; the shaft upon which this valve is fixed passes through the side of the valve casing, and has attached a weighted arm to counterbalance the weight of the valve. The by-pass is a 6-inch pipe, which passes around the check valve, and contains a safety valve. The pressure of 20 pounds required to open the safety valve is regulated by a weight upon a lever attached to the safety-valve stem. When the pumps are in motion the check valve remains closed, and the surplus water not used by the consumers passes through the by-pass and safety valve into the reservoir, and the pressure in the mains is increased 20 pounds over the reservoir head. When the pumps are stopped, or when from any cause the draft upon the mains is in excess of the pumping capacity, the pressure falls, the check valve opens and a supply is furnished from the reservoir.

The high presssure, or increased head, is furnished during the day hours, and during the night the supply is drawn from the reservoir. The check valve was designed and furnished by H. R. Worthington, of New York.

An indicator similar to that just described has recently been connected with the water works at Haverhill, Mass. There the water is pumped into an open iron tank, and, on account of the freezing of the surface during the winter, a float could not be used. To overcome this difficulty, the tank is connected with a tube containing mercury, upon which the float for operating the apparatus rests.

Very Hot Water and a Rumbling Boiler.

From J. B. F., *Hyde Park.*—I have a customer who has a hot-water boiler of the usual pattern, made of copper. It is connected with a coil of pipe in his store. For the purpose for which he uses the water it is necessary that it should be very hot—in fact, as hot as he can get it. But when the water is hot the boiler rumbles. Now, what I want to know is how I can stop the rumbling of the boiler and at the same time have the boiler very hot. The boiler is set higher than the stove and has a good circulation. If you can help me you will confer a great favor, both on me and my customer.

Note.—The question of a rumbling boiler has been frequently discussed in *The Metal Worker*, but not in the form put by our correspondent, and we hardly know how to answer it in this instance. The usual remedy is to reduce the temperature of the boiler to such a point as will prevent the formation of steam. This is done either by improving the circulation or by covering up or taking out a portion of the pipe in which the water is heated. Neither of these plans it seems are applicable in this case, because the water must be kept up very nearly, or quite, at the boiling point. We fear that there is no remedy without an entire change in the boiler setting, converting the boiler into an open tank, and even then, if it is desired to keep the water up to the boiling point, there would be a considerable amount of bubbling.

Improving the Water Elevator and Purifier.

From C. S. Warner, 135 *Freeman street, Brooklyn, E. D., N. Y.*—Your essay on my water elevator and purifier, given for the benefit of W. H. Young, Louisa C. H., Va., prompts me to ask you to help me overcome the objections you urge against the galvanized cup for raising water. Is there any way of japanning, painting or varnishing that will protect the cup from rust and render it water-proof, so that I can make it up in black iron, solder the joints and keep the cup water-tight? I find difficulty in using solder for the joints, and making them stand the great heat needed for some kinds of enameling or making water-proof.

Your article was a very intelligent exposition of the merits and demerits of the water elevator, and I am very grateful for the unsolicited endorsement.

Answer.—The cup to which Mr. Warner alludes is about 2½ inches square on the bottom and about 4 inches deep. Two opposite sides run up to a point, so that the cup looks like a tall, square house with the roof taken off. The dimensions given may not be exact, but they are near enough for all practical purposes. We think there should be no trouble in making up this cup in black iron, and folding the seams so tight that they will be water-tight without the use of solder. It will not make any difference then how high a heat is used in putting on the enamel; there will be no solder to melt, and the enamel will serve to fasten the joints.

Water Meters.

IV.

In the following article, the fourth of the series for which we are indebted to *Engineering News*, Mr. Lewis H. Nash takes up the faults of some of the popular designs for meters and treats of them at length:

In a previous article the writer directed attention to the mechanical difficulties which have to be encountered in the construction of a water meter, offered a few hints as to the best mode of overcoming them, and briefly stated a general principal by which the value of a device may be tested. In the present article he would draw attention to the application of these principles to well-known devices which operate upon the displacement principle

First, let us consider what may be called the inherent defect of a device. In studying any device it will be seen that, in order for it to succeed at all, certain contingencies arising from the nature of the design itself must be carefully guarded against. Though entirely free from the defects existing in other designs, some devices may still possess their own peculiar defects. For instance, a piston meter must have some valve device. This is inherent in the design, because, without it, the latter cannot work. The valve performs only a secondary part in the office of measurement; it requires great care in making, and is liable to get out of order; hence, it should be considered a defect.

The reciprocation of the pistons is another defective feature of this design, and special contrivances are necessary to overcome the difficulties arising from this condition. On the other hand, piston meters are free from defects to which many rotaries are subject. It does not follow, however, that because a device is defective it will be impossible to make the machine measure correctly.

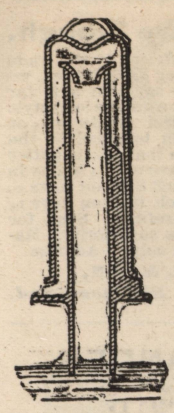
Assume that two persons, having identically the same conceptions, start to practically work them out. The first, possessed of a thorough knowledge of mechanical principles, may, by careful workmanship and attention to details, so design and construct his machine as to make it, in a measure, successful, even though the device itself be defective. The other, from lack of such knowledge, may fail to produce anything of value. This has been the history of some of the rotary meters which to-day are meeting with a degree of success. The essential principle has been tried by many persons, who have constructed machines to embody the idea; but, owing to imperfection of design or workmanship, they have failed to give any satisfaction, until some person with the required knowledge and experience has, by a peculiar combination of the parts, by careful adjustment and excellent workmanship, succeeded in producing a working machine.

No amount of skill can perfect a faulty design beyond a certain point, for the essential defects of the device cannot be eliminated. The most that can be expected is to so modify them as to reduce, as far as possible, their injurious effects; and after a time the design will have been so far perfected that no improvement can be made without a radical change in the design itself. Hence it is important that great judgment be used by a manufacturer in selecting a device upon which he is to spend his time and money.

Engineers and managers in charge of water works now demand such perfection in a meter that a design, to be successful, must be almost, if not absolutely, free from disturbing elements; while at the same time they require its price to be placed at such a low figure as to place many good designs beyond the reach of competition.

It needs almost a surgical operation to remove from the mind of an inventor an idea once conceived. It is the child of his brain, and becomes his pet. He conceives a love for it. Whatever be its faults, he hopes to overcome them. Others may see that the design is not capable of accomplishing the result desired; but he himself is blind, and cannot break away from his original conception. True it is that such tenacity of purpose will, if intelligent, develop the design to its greatest perfection, but if the same energy be directed upon the improvement of a faulty design, it becomes only a monument of folly.

The principle of reciprocating pistons is among the oldest of designs, and, in the opinion of the writer, it has been developed to about the highest state of perfection of which it is capable. It is the one which would strike the mind as being most likely to make a measuring machine, and in perfecting it the greatest amount of time and money have been expended. Modifications of the principle may be found with one, two, three or four pistons or plungers. The number of modifications of the valve-gearing is legion. Its pistons or plungers have



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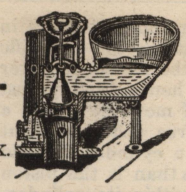

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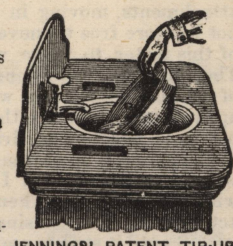

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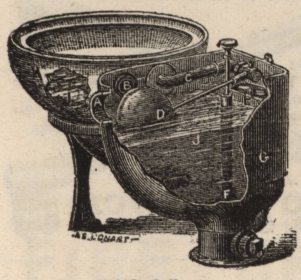

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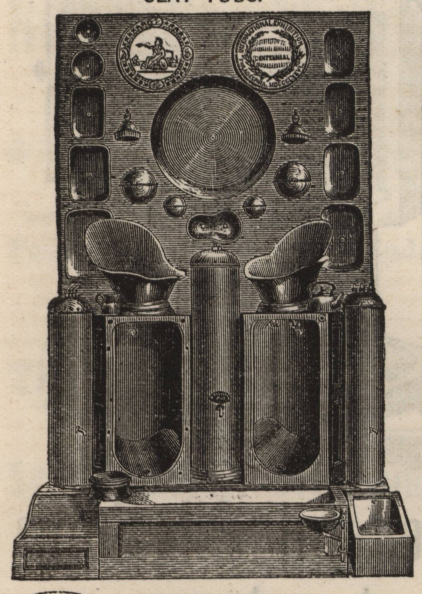

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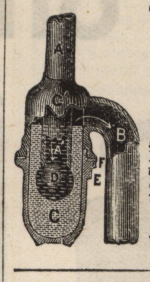

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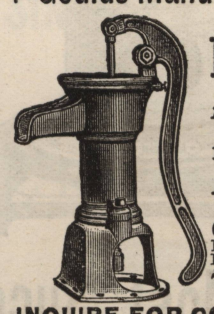

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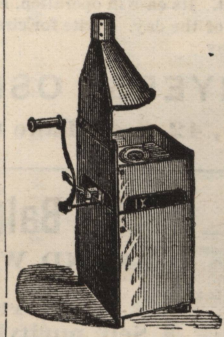

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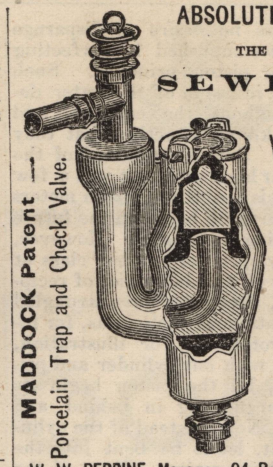

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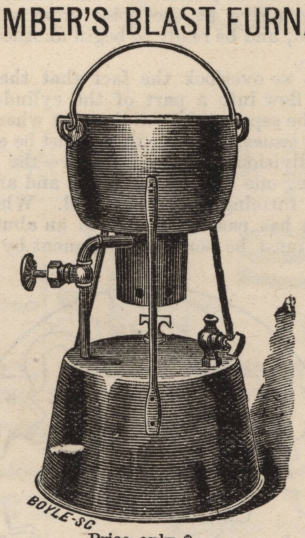

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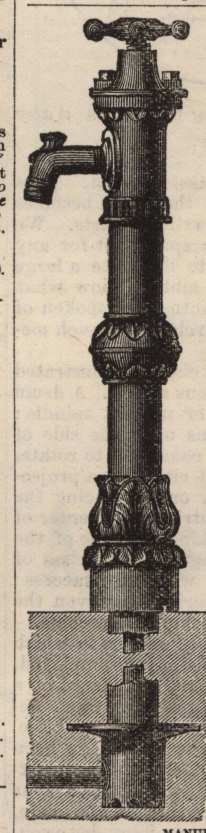

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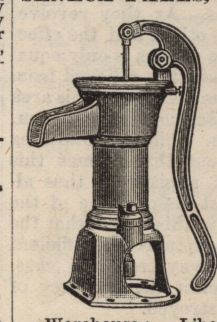

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been placed vertically, horizontally, parallel, at right angles to each other, and in many other relations. Various means have been adopted to control the length of stroke and movement of the piston—by abutting devices, by crank movements, and by sudden changes of the valve. Its pistons or plungers have been made of wood, of metal, and of various other substances. They have been made hollow so as to float in the water. The valves have been actuated by rocking arms carrying a weight, or by a spring; by the action of the fluid itself, and in various other ways. One piston has been made to control the valve of another. Attempts have been made to pack the piston, or plunger, with hemp, leather, rubber, or other materials. Many other things have been tried, of which the public have never heard, and it seems as if the ingenuity of man had been taxed to the utmost to perfect this principle. Yet it has only one good feature—namely, the total area of the piston is effective in driving, and there is no side pressure upon the piston. But it is solely to this feature that the piston-meter owes its value as a measuring device, for, whatever the clumsiness of design in the auxiliary parts, there is very sure to be power enough to drive them.

Let us follow the action through one cycle. We have a vision of a cylinder, bored perfectly true, with a piston fitting accurately into it. The piston starts from one end of the cylinder, the water flowing in from behind and driving it ahead. This is very beautiful so far, for the delivery amounts to exactly the area of the piston multiplied by the distance it traverses. But this cannot go on forever; our cylinder must have an end, and so must the stroke of the piston. At some point the piston must stop, and, if we are to register the number of its strokes, it must stop always in the same place. Here arises the first difficulty, and it is met with a series of devices to accomplish the desired result. Since the piston must come to a dead stop, it must be brought to rest without injury to the device. An abutting piece is, at best, only an apology for a serious defect, and, let it be made of whatsoever material we may, it will not do to let the piston strike it heavily; consequently we cannot have a high speed of piston. If we attempt to cushion with the liquid itself, we endanger the accuracy of the meter by causing variation in the length of stroke. If we introduce a crank to control the motion, we have introduced another part to wear out.

In the opinion of the writer, the only proper way to control the movement of the piston is by the flow of the liquid itself, which is the method adopted in single-piston meters. Again, our piston having reached the end of its stroke, the flow of the liquid must be changed in direction; and for that instant the flow, if it is to be continuous, must find another passage.

First. A valve is necessary to change the flow of the liquid, and this introduces another serious difficulty. It is impossible in this paper to discuss the various valve devices; their number and variety speak louder than language of the attemps in this direction, and show that inventors have long struggled with this problem.

Second. There are two ways by which a continuous flow is secured; first, by increasing the number of the pistons, and, second, by almost instantly reversing the valve. So long as the meter is not forced, both methods will be found practicable.

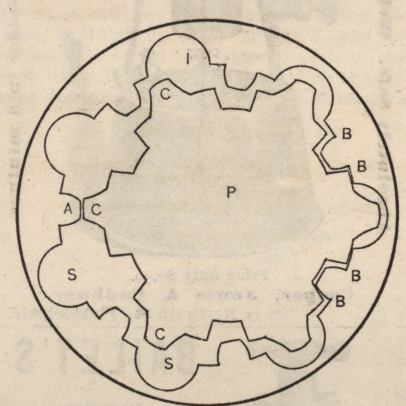
Piston meters usually possess ample power to drive them, and will work without close fitting, unless the design of the meter is very clumsy. If it be desired to increase the sensitiveness of the meter, the result may better be accomplished by reducing the resistance to the motion of the parts than by a resort to tight fitting. Since there are meters in the market which do depend upon the making of a tight fit, it is proper to make a few remarks upon the subject.

The question is asked: "We make a tight fit in our motors and pumps; why can we not do it in a meter, and by the same means?" To which it is answered: 1. Tight fitting is a primary requisite in a pump or positive motor, and must be secured at all hazards. 2. A motor is always under a kind of supervision, and it is somebody's business to keep it in order. This is not the case with a meter. The more water the meter will pass without registering, the better the consumer likes it; he will never give notice of the meter being out of order so long as he gets his water. 3. It is unnecessary, as a meter will work without being thus constructed. 4. A slight leak will not seriously injure a motor, while it may entirely destroy the accuracy of the meter upon small streams. Hence, it is apparent that if we make any attempt to fit tightly, we must carry the fitting throughout the whole machine—from piston to valve—and leave no passage anywhere for the fluid to pass. Thus, in addition to the other liabilities to derangement which are unavoidable, we have added another unnecessary one—the danger that, by some means, the perfect joint will be at some point impaired.

The diaphragm meter is designed upon the supposition that it is necessary to prevent all possible leakage. But even if a perfectly flexible and durable substance could be obtained for the diaphragm, it still possesses the defect of valve and gearing, besides a number of defects peculiar to itself.

The writer has no desire to disparage what has been accomplished in perfecting the reciprocating piston principle. Such meters have been in use in all the water departments throughout the country, and every engineer knows exactly what they have been doing. But the standard of the best meters is far higher than it was a few years ago, and it is doubtful if piston meters can be made to do much better in the future than they are doing at present. However, the field is widely open for another class of meters. In view of the difficulties of reciprocating motions, inventors have struggled with that of a continuous motion, as, for instance, that of rotation. For illustration, let us again start with our cylinder and piston. As before, let the piston begin its stroke, the water flowing in behind and driving it ahead. Now, instead of the cylinder being straight, let it be bent into the form of an annulus or ring. Then, if the motion of the piston be continuous, it will finally arrive at the point from which it started, and be ready to begin another revolution.

But we overlook the fact that the water must flow into a part of the cylinder that must be separated from the part whence the water issues. Hence, there must be at least two divisions of the cylinder—the piston forming one wall of separation and an abutment forming the other wall. When the piston has passed around to an abutment, there must be some arrangement by which



Water Meters.—Section of the Crown Water Meter.

it may be allowed to pass the spot. Thus our simple conception of the piston becomes much complicated by auxiliary parts. We have introduced this conception not for any value of its own, but to illustrate a large class of rotary meters, and to show what is the office of the "abutment" spoken of so frequently in patents relating to such meters.

One example of such a class was illustrated and described in a previous article. A drum rotates within a cylinder upon a spindle; projecting points or arms upon the side of the drum act as pistons, causing it to rotate. An abutment is formed either by a projection within the cylinder or by placing the center of the drum eccentric to the center of the cylinder, and so making one side of the case to act as an abutment. This class of meters has never met with any success; their defects are too serious for even the most exquisite workmanship to overcome.

There is another class of meters in which two or more revolving pistons are employed, and the use of an abutment is obviated by a combined action of the pistons. Such devices have been successfully used, as blowers, pumps and even fire engines have been constructed upon this principle. As an example, let us take one in which two spur gears run together. The teeth of the gears, meshing together, form a joint between, while the case, fitting upon the teeth, prevents the flow of water around the outside. In this device the effective driving area is only equal to the radial section of one tooth, and therefore such a device would be very faulty as a meter. A better form is that in which two revolving pistons are used. The two pistons are carefully hung upon bearings in such a way that they do not touch the case. They are connected with each other by gearing, so as to make the same number of revolutions. As they revolve, one piston overlaps the other, and the effective driving area of the pistons is only equal to the amount of surface thus relieved from pressure. In one of the best forms this area amounts to one radial action of the piston, or half its total section, while the total area of the pistons is about three times this amount. One side of a piston is thus always advancing against the pressure of the liquid. It is essential in this device that the pistons revolve upon a spindle of sufficient rigidity to keep them away from the case, for if they were to touch it the accuracy of the meter would be destroyed.

The National Meter Company, of New York, is now manufacturing a meter called the "Crown," which has none of the defects of rotary meters, while at the same time it possesses the valuable feature of reciprocating piston meters, viz., the total area of piston is effective in driving. The following illustration presents a view of the piston in its cylinder. There is no spindle or bearing of any kind to keep in order; the piston simply rolls around the inside of the cylinder. It is made of hard rubber and just floats in the water, being of about the same specific gravity. The piston of the half-inch meter weighs but five ounces; hence, the slightest motion of the liquid will move it. If in a piston meter we had a free piston, without attachments, moving in a cylinder, it could not be more free to move than is the piston of this meter to move within its cylinder. The only work to be done is to drive a train of gearing connecting with the registering apparatus, and, since the total area of the piston is effective in driving, the power is ample. Let S S be the space in which the water is entering, and I I the space from which it can escape. Then the line of pressure acts from A to B, causing the piston to roll over B until it strikes another bearing point, and continues its rotation from point to point. The piston is its own valve, and the pressure of the liquid is so exactly balanced that there are no rubbing surfaces. Actual experiment has proved this to be the fact, for when meters that have been in constant use are examined, it is found that the case is completely tarnished, as if there had been no moving piston passing over it. In this design there are not a number of things which must be kept up to a certain standard of perfection, the failure of any one of which would destroy the accuracy of the machine, but it is ready to do its work at all times. It will pass anything ordinarily found in water furnished to cities. The company believe that they have the meter which will stand the greatest amount of abuse of any in the market, and, at the same time, such abuse will not materially alter the registration of the meter. An experimental meter has been fitted up very loosely to see what the effect would be upon the registration, and it was found that the piston will run and measure correctly, even when it is cut very much smaller than the cylinder, and that no amount of hacking will prevent its movement which does not actually destroy it. These meters, as ordinarily fitted up at the factory, will register upon a stream 1-100th of an inch in diameter.

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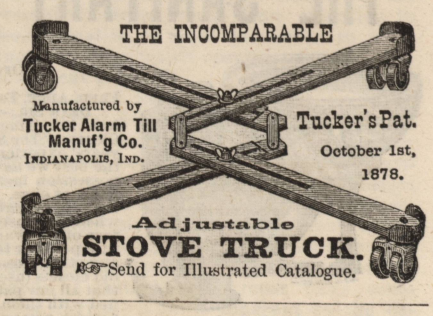

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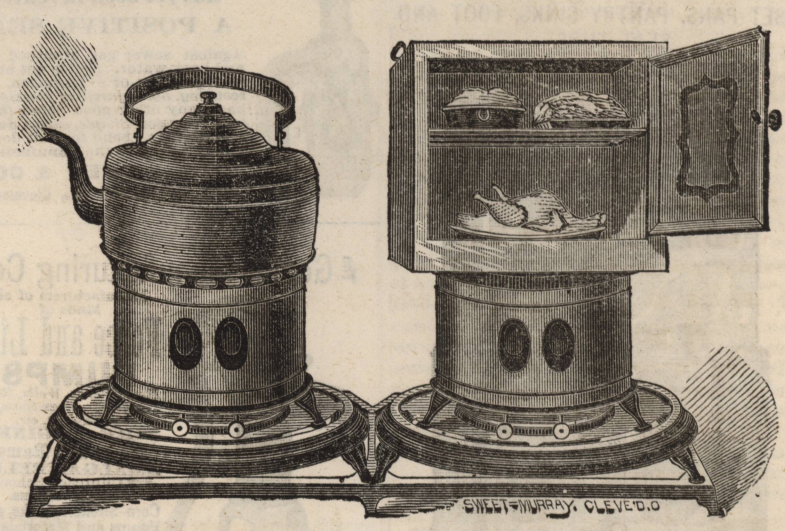

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[Extract from the BOSTON COM. BULLETIN, January 10, 1880.]

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The public expect something new every year in the stove line, but it is doubtful if ever improvements have appeared that have so soon brought such a shower or *tidal wave* of commendations and congratulations as flow in from the West. And with the new stone lining not an iota of clinker adhered to a stove we saw that had been in use since cold weather came on, fed with the most stubborn of tarry soft coal.

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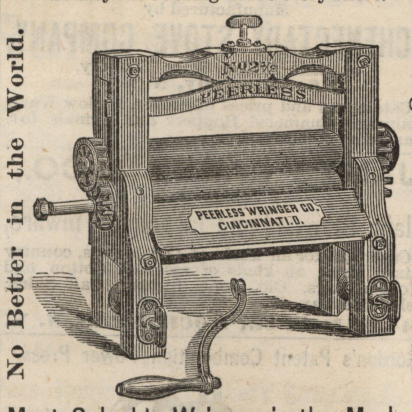

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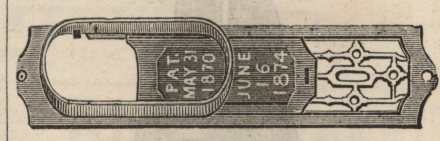

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21 to 24	" 5½ @ 5¾c	6¾ @
25 to 26	" 6 c	7 @
27	" 6¼c	7¼@
28	" 6½c	7½ @

Galvanized, 10 to 20, B B, ₩ lb 11½c; 2d quality, ₩ lb 10½c
" 21 to 24, " " 12½c " .... " 11½c
" 25 to 26, " " 13½c " .... " 12½c
" 27 " " 14½c " .... " 13½c
" 28 " " 15½c " .... " 14½c
Patent Planished..... ₩ lb A, 12 B. 10 c
Russia..... ₩ lb, 13c @ 14c
Am. Cold Rolled..... ₩ lb 6½ @ 7½c

Iron Wire.

Brass and Copper.....List of December 1879. dis 10 %
Bright and Annealed.....Nos. 0 @ 18. dis 35@37½ %
" " .....Nos. 19 @ 26. dis 45@47½ %
" " .....Nos. 27 @ 36. dis 50@52½ %
Coppered.....Nos. 0 @ 18. dis 30@32½ %
Galvanized, Nos. 0 to 6.....₩ lb 10c. dis 30@32½ %
" Nos. 7 to 18.....market list, dis 30@32½ %
Tinned, Nos. 0 to 18.....dis 35@37½ %
Tinned Broom Wire, Nos. 18 to 25.....dis 47½@50 %
Annealed Fence, Nos. 8 and 9.....dis 35@37½ %
" Grape. Nos. 10 to 14.....dis 35@37½ %
Galvanized Telegraph, Nos. 7 to 9.....₩ lb 9c
" " Nos. 10 and 11.....₩ lb 10c
" " No. 12.....₩ lb 10½c
Fence Staples.....₩ lb 6½@7c
" Staples, Galvanized.....₩ lb 8@8½c
Stubs Steel Wire.....$7.00 to 2
Japanned Barb Fence.....₩ lb 11½c
Galvanized " .....₩ lb 12½c
Judd's Picture Wire.....dis 80&20&10 %
Clothes Line Wire, Galvanized.....₩ coil 30@ 40c net

COPPER.—DUTY: Pig, Bar and Ingot, 5c; Old Copper, 4c ₩ lb: Manufactured (including all articles of which Copper is a component of chief value), 45 % ad valorem.

SHEATHING, BRAZIERS' COPPER, BOLTS, &C.

Braziers' Copper, ordinary sizes, 10 oz., ₩ sq. ft. and over.....₩ lb 34c
Braziers' Copper, ordinary sizes, 16 oz. and over 12 oz., ₩ sq. ft.....36c
Braziers' Copper 10 oz. and 12 oz., ₩ sq. ft.....38c
" Lighter than 10 oz., ₩ sq. ft.....40c
Circles less than 84 inch in diameter.....37c
" 84 inch diameter and over.....40c
Segment and Pattern Sheets.....37c
Locomotive Fire Box Sheets.....34c
Sheathing Copper, over 12 oz. ₩ sq. ft.....32c
Bolt Copper.....34c
Copper Bottoms.....35c

No Copper is Sheathing except 14x48 inches, and not to exceed 34 oz. to the sq. ft.

TINNING.

14x48, by the case.....₩ sheet 6c
14x48, less than case.....8c

For tinning both sides, double the above amount.

O'NEILL'S PATENT PLANISHED COPPER. net.

14x48.
16 and 16 oz. and heavier....37c By the case...₩ lb 36c
12 oz. and lighter.....40c " " ... " 39c

Boiler Sizes.

7 in., 14x52. 8 in., 14x56. 9 in., 14x62.
and 16 oz. and heavier....39c By the case...₩ lb 38c
(And all sizes not over 20 inches wide.)
30x60.
14 and 16 oz. and heavier.....₩ lb 41c
12 oz.....44c

Brass.

Brown & Sharp's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' PRICE LIST.—dis 10%
January 15, 1880.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lb, add 3c ₩ lb.

HIGH BRASS.

All Nos. not thinner than to No. 28, wider than 2 in., not wider than 14 in.....32c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive.....37c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in., inclusive.....40c
½c ₩ lb advance on each No. above Nos. 28 to 38, inclusive.
All brass thinner than No. 38 is Platers' Brass, at...55c
Sheets 24x48 in., and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in.....39c
Printers' Rules.....47c
Sheets wider than 30 in. and under 40 in.....49c
" " 40 in. and over.....52c
Circular sheets, in diam. from 4 in. to 14, inclusive...42c
" " over 14 " 20, " ...47c
" " " 20 " 30, " ...51c
" " " 30 " 40, " ...57c
" " " 40 in.....61c

LOW BRASS.

Four cents ₩ lb more than High Brass.
Gilding Metal 8c ₩ lb more than High Brass.
Platers' or Gold Metal { In Bars.....50c / Sawed.....53c / Planed or Polished.....56c

FOR SLITTING.

Metal, in width 2 in. to ½ in. to No. 28, inclusive 1c ₩ lb advance.
Metal, in width 2 in. to 1 in. thinner than No. 28, 2c ₩ lb advance.
Metal, in width 1 in. to ½ thinner than No. 28, 3c ₩ lb advance.
Metal, in width ½ in. to ¼, inclusive, not thinner than No. 28, 2c ₩ lb advance.
Metal, in width ½ in. to ¼ thinner than No. 28, 5c. ₩ lb advance.
Metal, ¼ in. in with and less, 10c ₩ lb advance.
Any of the above widths cut to particular lengths, add 7c ₩ lb.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire.
4 per cent., 12 in. to No. 26	$0.52	$0.70
6 " " "	.56	.76
10 " " "	.64	.88
15 " " "	.74	1.03
18 " " "	.80	1.12

German Silver Sheets over 12 in. wide and weighing more than 16 lb. $2 ₩ lb.
Advance 2c for each additional inch in width above 12 in., and 2c ₩ lb on each No. thinner than Nos. 26 to 36, inclusive.
All German Silver thinner than No. 36 is Platers' at 50c ₩ lb additional.
German Silver Scrap one-half less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Gild'g and Cop'r.
No. 0 to 20	$0.35	$0.39	$0.45
No. 21	.38	.42	.48
No. 22	.39	.43	.49
No. 23	.41	.44	.50
No. 24	.42	.46	.52
No. 25	.45	.49	.55
No. 26	.47	.51	.57
No. 27	.50	.54	.60
No. 28	.54	.58	.65
No. 29	.57	.61	.68
No. 30	.60	.64	.74
No. 31	.54	.68	.80
No. 32	.68	.72	.86
No. 33	.72	.76	.95
No. 34	.76	.80	1.05

Spring Wire 2c ₩ lb advance.
Flat, Square and Half Round Wire, 5c ₩ lb advance on Round Wire.
Fancy Wire not less than 20c ₩ lb advance Round Wire.

Brass Rods, No. 8 and larger, not less than 2 feet lengths, 38c.
Wire straightened and cut smaller than No. 8, and not less than 2 feet lengths, 43c.
Wire and Rods less than 2 feet lengths, special rates.
Twelve cents ₩ lb extra for spooling on 1 lb spools.

MISCELLANEOUS.

Brass Pail Ears.....$0.52
Brass Door Rail.....45

SCRAP—Net.

High Brass.....$0.14
Low " 16
Gilding 18
Turnings, Filings and Chips half the price of Scrap.
Terms—Net cash. Interest to be added after thirty days.

TUBING—DIS. 10 % ₩ lb

Plain to No 20, inclusive, above ¼ in. to 3 in.....$0 45
" above 3 in.....55
Nos. 21, 22, 23, 20 advance on List for each Number.
Nos. 24, 25, 26, 40 advance on List for each Number.
Above No. 26 special rates.
Plain ¼ in.....77
" 3-16 in.....1.12
⅛ in.....1.62
All Mandrel Drawn Tubes, 5 cents advance on List Prices.
Fancy Tubing to No. 20.....52
English, Scotch and Extra Patterns Fancy Tubing to No. 20.....57
Tubing Sawed or Cut 2 to 4 feet long, 2c advance on List.
Add to 2c ⅛c for each additional cutting under 2 feet.
All Mandrel Drawn Tubes under ¾ in., 25c ₩ lb advance.

ZINC TUBING—NET.

Plain.....29
Fancy.....35
Scotch and Extra Patterns.....38

GERMAN SILVER TUBING—DIS. 10 %.

4 per cent.	.80	15 per cent.	1.35
6 "	.90	16 "	1.40
9 "	1.05	18 "	1.50
12 "	1.20	20 "	1.60

LEAD—DUTY: Pig, $2 ₩ 100 lbs.; old Lead, 1½c ₩ lb: Pipe and Sheet, 2¾c ₩ lb.

American.....6¾ @ 6⅞c
Bar.....dis 10 %.....7½c
Pipe.....dis 10 %.....7¾c
Tin-Lined Pipe.....dis 10 %.....15c
Sheet.....dis 10 %.....8⅛c
Shot.....dis 10 %Drop, 7⅜c Buck, 8⅛c dis 10 %
Chilled Shot.....dis 10 %.....9 c dis 10 %

BABBITT METAL.

N. P. U.....₩ lb 7 @ 8c
A, 20c · B, 16c; C, 12c; D.

ANTIMONY.....20 @ 22c

TIN—DUTY: Plates, Sheets, Tagger and Terne, 1.1c ₩ lb; Electro-galvanized Plates, 2c ₩ lb; Manufactures of, not enumerated, 35 % ad val. Bars, Block and Pigs free. Banca, subject to duty of 10 %.

Banca.....₩ lb 28c
Straits.....₩ lb 26c
English.....₩ lb 25c

TIN PLATES.

I C 10x14, 14x20, 12x12 } Prime Charcoal.....$10.00@ 10.50
" " .....$10,25@ 10.75
I X 10x14, 14x20, 12x12 } Prime Charcoal.....$12.00 @ 12.50
" " .....$12.25 @ 12.75
D C 12½x17 " .....$9.50 @ 10.00
D X 12½x17 " .....$11.50@ 2.00
For each Aditional X add.....2.00

COKE TIN PLATE.

	Best.	2d. quality.	Wasters.
I C 10x14, I C 14x20	$9.50	8.75 @ 9.00	8.25 @ 8.50
I C 12x12	$9.75	9.00	8.50 @ 8.75

TERNE PLATE.

	Prime Char.	2d. quality.	Coke.
I C 14x26	9.25 @ 9.50	@ 9.00	@ 8.75
I X 14x20	@ 11.50		
I C 20x28	19.00 @ 19.50	18.00 @ 18.50	@ 17.50
I X 20x28	@ 23.50		
I C 20x200	@ 27.00		
14x20 M. F. Brand			11.00

SOLDER.....No. 1, 14c @ 15c; No. 2, 13½c
SPELTER—DUTY: Pigs, Bars and Plates, $1.50 ₩ 100 lbs.
American, ₩ 100 lbs.....6¼c@6¾c
Bergen Port from Lehigh Ore.....10c
Lehigh, on spot.....9c
ZINC—DUTY: Pig or Block, $1.50 ₩ 100 lbs. Sheet, 2¼c ₩ lb.
Sheet, " .....cask, 8¼ @ 8½c
" .....open, @ 9 c

Paper Stock, &c.

(Dealers' Selling Price.)

Canvas linen.....@ 5
White cotton, New.....5½ @
" " No. 2.....3½ @
White linen rags. No. 1.....@ 6 c
" " No. 2.....4 @
Seconds.....2½ @
Mixed woolens.....2½ @ 3¼c
Soft woolens.....17 @ 18 c
Gunny bagging.....3⅜ @
Jute Butts.....3 @ 3½c
Kentucky bagging.....4½ @
Waste paper and scraps.....@ 1c
Rope cuttings.....1⅝ @ 3 c
Kentucky bale rope.....4 @ 4½c
Grass Rope.....@ 3½c
Tarred shaking.....1½ @
Hard white shavings, No. 1.....3½ @ 4c
Soft " No. 1.....3 @ 3½c
White shavings. No. 2.....2¾ @
Mixed shavings, part white.....2¼ @ 2¾c
Imperfections, No. 2, best folded sheets. ....3¼ @
" No. 1, heavy stock.....3½ @
Book stock.....2¾@3c
" heavy.....3c
" light.....1½@1¾c
Newspapers.....2¼ @ 2½c
Prints.....1¼ @
Pure manilas.....2 @2½c
Bogus manilas and hardwares.....¾ @ 1
Commons.....70 @
Binders' board cuttings.....80 @
Straw board cuttings.....75 @
Woolen tailor clips.....18 @ 19c
Satinet tailor clips.....2½ @ 3½c

Paints, Oils, etc.

Paints.

Black lamp—Coach Painters.....₩ lb 20c
" " Ordinary.....6c
" Ivory Drop, fair.....12 @ 15c
" " best.....23c
Black Paint, in oil.....kegs, 8c; assorted cans, 11c
Blue. Prussian, fair to best.....40 @ 55c
" " " in oil.....25 @ 55c
" Chinese dry.....8½c
" Ultramarine.....18 @ 30c
Brown, Spanish.....1¼c
" Van Dyke.....10 @ 12c
Carmine, 40.....combination price
Green, Chrome.....15 @ 23c
" " in oil.....14 @ 18 @ 25c
" Paris.....good, 25c; best, 30c
" " in oil.....30c; " 45c
Iron Paint, Bright red.....₩ lb, 2¼c
" Red....." 2c
" Brown....." 1½c
" Purple....." 3c
" Ground in oil, Bright Red....." 5½c
" " " Red....." 5c
" " " Brown....." 4½c
" " " Purple....." 6c
Mineral Paints.....1¼ @ 4c
Orange Mineral.....10c
Red Lead, American.....7½c
" Venetian (N. C.) dry.....$1.65 @ $1.70
" " in oil.....asst'd cans, 11c; kegs, 8c
" Indian dry.....9 @ 12c
Rose Pink.....10 @ 13c
Sienna, American, Raw.....4c
" Burnt.....4½c
" " in oil.....10 @ 16 @ 20c
" Raw " .....11 @ 15 @ 25c
Umber, Burnt.....4 @ 8c
" " in oil.....9 @ 12 @ 16c
" Raw.....3½ @ 7½c
" " in oil.....10 @ 16 @ 18c
Vermillion, Chinese.....90c
" English.....60 @ 62½c
" Trieste.....1.00
" American, Common.....15c
White Lead, American, pure dry.....6 to 7c
" " " in oil.....8½c to 9c
White, Paris, English, prime.....in bbls. 2 @ 2½c
Yellow Ochre, French.....$1.75
" " in oil...asst'd cans, 11c; kegs, 8c
" " Vermont.....in casks 1½c
Yellow Chrome.....17 @ 27c
" " in oil.....14 @ 18 @ 25c
Zinc White, American No. 1, dry.....5 @ 5½c
" " No. 1, in oil.....9c
" French (Paris).....8 @ 10c
" " in oil.....@ 10c

Oils.

Linseed, Raw, in casks and bbls.....₩ gal. 85@ 86c
" Boiled, " " .....90@91c
Bleached Whale.....63c
" Elephant.....68c
" Sperm.....1.15c
Signal.....65c
Prime Lard.....66c
No. 1 " 60c
West Virginia.....18 @ 25c
Drilling.....40c
Empire Cylinder.....62c
Miners Oil.....45 @ 50c
Fish Oil, pressed.....48c
Neatsfoot.....85c
Tallow.....70c
Machinery.....40c
Engine.....50c

Sundries.

Asphaltum.....9c
Benzine.....₩ gal. 15c
Chalk.....¾c
" Block.....¾c
Dryer, Patent, Am'n.....ass't cans 10½c; keg, 9c
Frostings.....50c
Glue, White.....33 @ 44c
" Sheet.....20c
Glaziers' Points, Zinc.....8c
Gum, Copal.....36c
" Damar.....25c
" Shellac, English.....48c
" " dark.....12c
Litharge, English.....7½c
Mineral Wool, lb.....1¼ @ 1½c
Pumice Stone, selected Lumps.....4 @ 6c
" powdered.....2¾c
Putty in bladders.....3c
" in bulk.....2½c
Rotten Stone, soft, English.....
Spirits Turpentine.....42c
Whiting, Spanish.....¾c

CHARCOAL LEADED PLATE, IC 14x20, IX 14x20.

CHARCOAL LEADED PLATE, IC 20x28, IX 20x28.

COKE LEADED PLATE, IC 14x20, IC 20x28.

CHARCOAL BRIGHT PLATE, The Various Sizes.

COKE BRIGHT PLATE, The Various Sizes.

SHEET IRON—American Russia, Patent Planished. Tuttle & Bailey Registers at factory prices.
Coal Hods, Elbows, Stove Boards, Shovels, &c.

A Full Assortment of Tinmens' Supplies.

LYON, CONKLIN & CO., Baltimore.

EAGLE FACING MILLS AND PLUMBAGO WORKS,

CINCINNATI, O.,

MANUFACTURERS OF

FOUNDRY FACINGS, PLUMBAGO AND BLACK LEAD,

AND OF THE CELEBRATED

PURIFIED FIRE-PROOF STOVE VARNISH.

Our **Heavy Stove Plate Facings** and our **Return Facings** are now used by **300 of the Leading Stove Manufacturers** of this country. These Facings do not run before the iron, scale cleanly and leave a bright, smooth casting. No stove dealer should be without our **STOVE VARNISH. It saves labor, prevents rust and is durable.**

All kinds of Plumbago, in any quantity, at bottom figures. Send for prices.

S. OBERMAYER & CO., Prop's.

TROY STOVE LINING AND FIRE-BRICK WORKS.

BACON & HENRY,

Successor to **J. BLUNT BACON** and **BELL & BACON,**

STOVE, RANGE AND HEATER LININGS

Fire Brick, Blocks, &c.

Corner of First and Monroe Streets, - - - - TROY, N. Y.

Manufactured by

SCHENECTADY STOVE COMPANY,

at their Hollow Ware Foundry,
Schenectady, N. Y.

Catalogues and prices of Stoves, Hollow Ware Plain and Enameled Hoppers and Urinals forwarded on application.

JAMES LANEY & CO.,

Jobbers in

Plain, Stamped and Japanned Tinware,

Cash paid for all kinds of Old Metals, country mixed Rags, all kinds of assorted Cotton and Woolen Rags, Old Rope, Rubber, Calf Skins, Pelts, Beeswax, &c.

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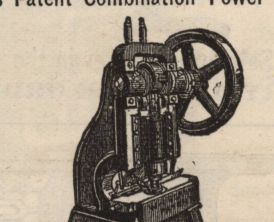

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235 Bread Street, cor. New Street, Philadelphia.

ASH'S

IRON ADJUSTABLE

This Truck can be adjusted to any size Range, Cooking or Heating Stove made, and can be lubricated without removing the stove. Being all iron, it is very durable and neat. As its name implies, it is the most perfect Stove Truck ever offered to the trade. Weight of truck, 19 lbs. Price, $2 50, net.
Manufactured by **JAMES ASH,**
No. 108 W. Van Buren st., Chicago, Ill.

A. F. WRIGHT,

2356½ Broadway, Cleveland, Ohio

PATENTEE AND MANUFACTURER.

The purpose of which is not only
TO GUARD AGAINST FIRE,
BUT ALSO
To Render the Chimney Flue adaptable to Stovepipes differing in size.

WHEELER'S
Improved
STOVE PIPE FLUTER
CAN'T BE BEAT.
For sale by Cragin Bros. & Chandler, Chicago, Ill.; F. Haberman, New York; Phillips, Buttorff & Co., Nashville, Tenn. Made by W. A. Wheeler, Indianapolis, Ind.

Galvanizing and Tinning Works.
WORKS, Greenpoint, L. I. 12 Peck Slip, N. Y.
S. WHITNUM,
Manufacturer of COAL HODS,
And other Sheet Iron work.
Sheet Iron, Nails, Spikes, &c. Galvanizing done at shortest notice. Large orders contracted for at special rates. Send for Price List.

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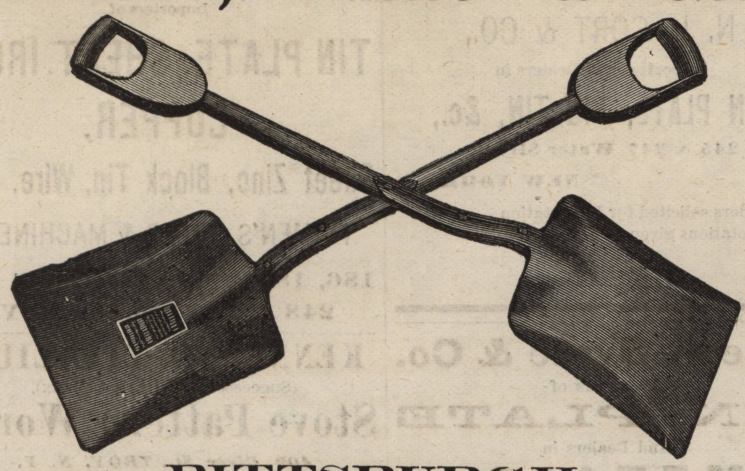

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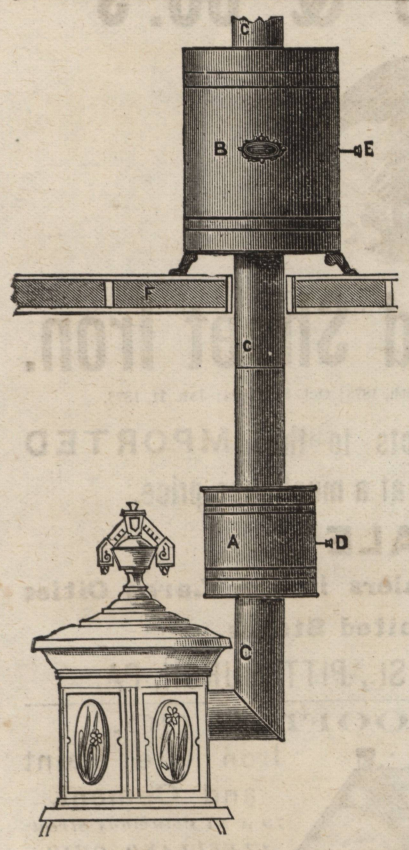
SHOVELS, SPADES & SCOOPS.



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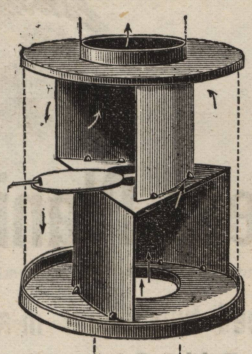
HEAT MULTIPLIER.



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Liberal Discount to the Trade.

The Great Fuel Saver and Heat Economizer.

Will Save its Cost in a Single Month.

Saves one-third to one-half the Fuel.

Can be attached to any Stove without expense.

Address,

AMERICAN CO-OPERATIVE MFG. CO.,

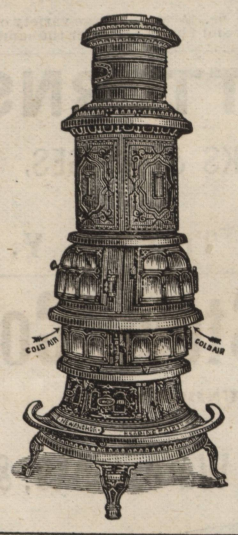
170 La Salle St., Chicago.

WANTED.

Reliable parties in every city and town to introduce and control its sale.

ORR, PAINTER & CO.,

MANUFACTURERS OF



Stoves, Heaters, Ranges, &c.

Specialties as follows:

Light House Cook, Harmony Cook, Excelsior Penn Cook, Morning Light Cook, Olive Branch Cook, Advance Cook, Progress Cook, Emerald Cook, Cadet Cook, Pride of Home Cook.

RANGES.

Sunshine, Alpine, Keystone, Record, Ivy, Beauty, Poesy, Stuart, Clarion, May Flower, Extra Sterling (brick set), and Excelsior Penn (brick set).

PARLOR HEATERS.

New Anchor, Anchor, La Grande and Twilight.

PARLOR STOVES.

Irving, La Grande, Early Dawn, Anchor, Iris, La Belle, Fairy, Twilight and Coral.

EGG CYLINDER STOVES: Magnet and Etna.

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PORTABLE FURNACE: Equator.

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SAM S. UTTER,

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THE SAM RANGE Is the greatest success of the age. It is now made in 13 sizes. Over 15,000 in use to-day.

Large sales being made of the new first-class cheap Range, **WIDE AWAKE.**

Now ready, the beautiful Base Burner for 1879. **LIBERTY PARLOR.**

The first-class self-feeder for 1879, **STAR KING,** and the new cheap self-feeder, both plain and extra finish, **FLORA.**

An immense variety of Cooking and Heating Apparatus for every want.

Agents for the Manufactures of CHAS. NOBLE & CO. Phila.

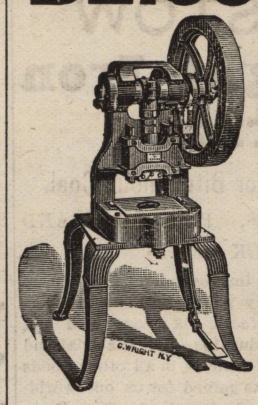
EVERYTHING AT POPULAR PRICES.

EMPIRE FORGES IMPROVED without Belts, Bellows, Crank Pins Dead Center or Back Motion. Send for circular.

EMPIRE PORTABLE FORGE CO., COHOES, N. Y.

GOLD MEDAL AWARDED PARIS EXPOSITION, 1878.

BLISS & WILLIAMS,



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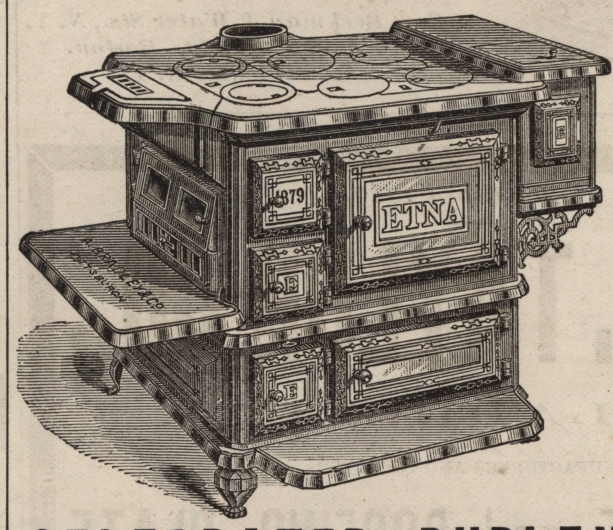
PRESSES, DIES AND SPECIAL MACHINERY

For Working Sheet Metals, &c.

FRUIT AND OTHER CAN TOOLS.

Plymouth, Pearl and John Streets, Brooklyn, N. Y.

ETNA STOVES AND RANGES.



Heavy Lids and Connection, Cut Top, Automatic Shelf and the

CELEBRATED DUPLEX GRATE.

Hereafter the Etna Ranges will be made both Right and Left. This will meet a long felt want.

A. BRADLEY & CO.,

Send for Catalogue. Pittsburgh, Pa.

STUART, PETERSON & CO.,

PHILADELPHIA,

Manufacturers of the following Celebrated

STOVES, HEATERS AND RANGES.

Sunnyside Baltimore Fire Place Heater,
Fire Queen Cellar Heater and Brick Heaters,
Sunnyside Flat Top Ranges,
Rosedale Cooking Stove,
Barley Sheaf Cooking Stove,
Sunbeam and Early Bird Ranges,
Lily of the Valley Heating Stove, &c.

ENTERPRISE Mfg. CO. of PA.

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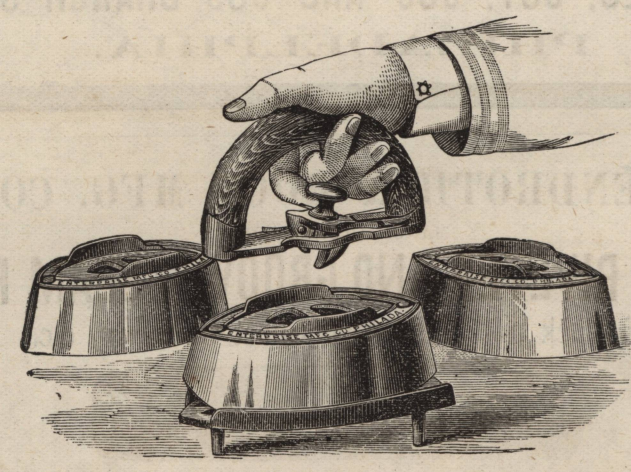

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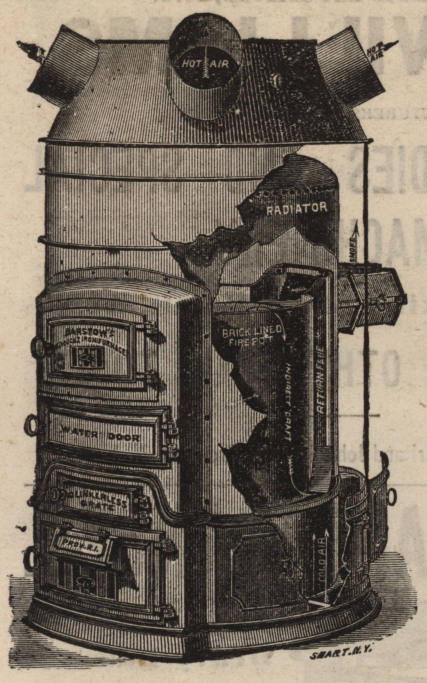

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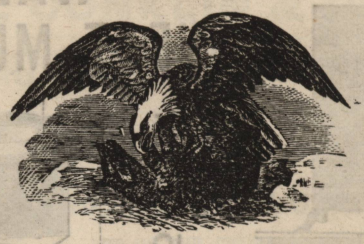

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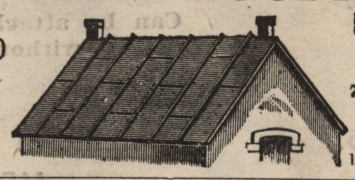

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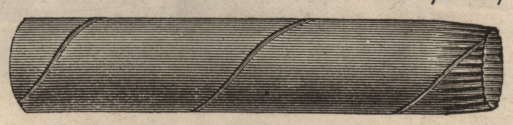

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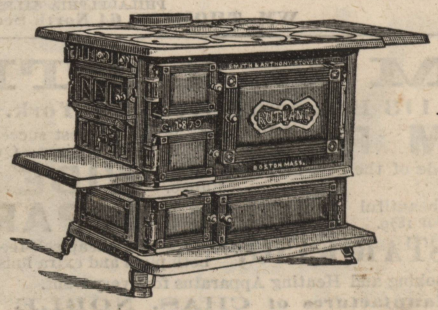

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